PROPOSED ACTION:	Issuance of an Incidental Harassment Authorization for the Anchorage Port Modernization Project Test Pile Program in Cook Inlet, Alaska.
TYPE OF STATEMENT:	Final Environmental Assessment
LEAD AGENCY:	U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service
RESPONSIBLE OFFICIAL:	Donna S. Wieting, Director Office of Protected Resources, National Marine Fisheries Service
FOR FURTHER INFORMATION:	Rob Pauline National Marine Fisheries Service Office of Protected Resources Permits and Conservation Division 1315 East West Highway Silver Spring, MD 20910 301-427-8401
LOCATION:	Cook Inlet, Alaska
ABSTRACT:	This Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Office of Protected Resources' proposal to issue an Incidental Harassment Authorization, pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act, to the Port of Anchorage for the take of small numbers of marine mammals incidental to conducting a Test Pile Program in support of the Anchorage Port Modernization Project (APMP) in Cook Inlet, Alaska.
DATE:	March 2016

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LIST OF ACRONYMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish & Game
ANVSA	Alaska Native Village Statistical Area
APMP	Anchorage Port Modernization Project
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIMMC	Cook Inlet Marine Mammal Council
CPT	Cone Penetrometer Test
dB	decibels
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	essential fish habitat
ESA	Endangered Species Act
FR	Federal Register
FONSI	Finding of No Significant Impact
Hz	hertz
ICRC	Integrated Concepts & Research Corporation
IHA	Incidental Harassment Authorization
JBER	Joint Base Elmendorf-Richardson
KABATA	Knik Arm Bridge and Toll Authority
kHz	kilohertz
km^2	square kilometers
LGL	LGL Limited
m	meters
mi^2	square miles
MMPA	Marine Mammal Protection Act
MOA	Municipality of Anchorage
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MTRP	Marine Terminal Redevelopment Project
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
OMB	Office of Management and Budget
POA	Port of Anchorage

PSO	Protected Species Observer
rms	root mean square
Secretary	Secretary of Commerce
SFS	Scientific Fishery Systems, Inc.
SHPO	State Historic Preservation Officer
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
ZOI	Zone of Influence

Chapter 1 Introduction and Purpose and Need

1.1. Description of Proposed Action

The Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S. Code [USC] 1631 *et seq*.), prohibits the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment, which includes injury and behavioral effects. The MMPA defines harassment as any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (2) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

There are exceptions to the MMPA's prohibition on take, such as the authority at issue here for us to authorize the incidental taking of small numbers of marine mammals by harassment upon the request of a U.S. citizen provided we follow certain statutory and regulatory procedures and make determinations. We describe this exception set forth in the MMPA at Section 101(a)(5)(D) in more detail in Section 1.2.

In response to the Port of Anchorage's (POA) request, the National Oceanographic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) proposes to issue an Incidental Harassment Authorization (Authorization) to the Municipality of Anchorage (MOA), through its POA department, under the MMPA. This IHA would allow the POA to take small numbers of marine mammals, incidental to the conduct of the POA's proposed Test Pile Program for the Anchorage Port Modernization Project (APMP) in Cook Inlet, Alaska. We do not have the authority to permit, authorize, or prohibit the POA's APMP Test Pile Program under Section 101(a)(5)(D) of the MMPA, as that authority lies with a different Federal agency.

Our issuance of an Authorization to the POA is a major federal action under the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations in 40 Code of Federal Regulations (CFR) §1500-1508, and NOAA Administrative Order (NAO) 216-6. Thus, we are required to analyze the effects of our proposed action on the human environment.

This Final Environmental Assessment (EA), entitled "*Issuance of an Incidental Harassment Authorization for the Anchorage Port Modernization Project Test Pile Program in Cook Inlet, Alaska*," (herein, Final EA) addresses the potential environmental impacts of two alternatives available to us under section 101(a)(5)(D) of the MMPA, namely:

- Issue the Authorization to the POA under the MMPA for Level B harassment of marine mammals during the APMP Test Pile Program and in-water sound propagation parameter measurements, taking into account the prescribed means of take, mitigation measures, and monitoring required in the proposed Authorization; or

- Not issue an Authorization to the POA in which case, for the purposes of NEPA analysis only, we assume that the activities would proceed and cause incidental take without the mitigation and monitoring measures prescribed in the proposed Authorization.

1.1.1. Background on the Port of Anchorage's MMPA Application

To comply with the MMPA, the POA has submitted an IHA application to NMFS due to the presence of marine mammals in the vicinity of the proposed Test Pile Program. The POA is requesting an Authorization for the harassment of small numbers of marine mammals incidental to conducting a Test Pile Program as part of their APMP in upper Cook Inlet, Alaska.

The proposed Test Pile Program would install ten 48-inch steel pipe indicator test piles adjacent to the existing POA facilities, gather geotechnical data near test pile locations, test mitigation applications (e.g., encapsulated bubble curtain and resonator system), and measure in-water sound propagation parameters (e.g., transmission loss and water depth) during pile installation. The Test Pile Program would inform and support the design of the APMP by using indicator piles to collect design load information as well as evaluate pile drivability and other pile installation variables along the length of the planned APMP wharf alignment. Pile installation would be integrated with a hydroacoustic monitoring program to collect empirical data on noise levels produced during pile-driving operations in the waters of Knik Arm. Results from the hydroacoustic monitoring would then be used to assist in design decisions as well as to develop monitoring and mitigation methods to reduce impacts to marine mammals from future construction of the entire APMP.

Proposed activities included as part of the Test Pile Program with potential to affect marine mammals within the waterways adjacent to the POA include vibratory and impact pile-driving operations.

1.1.2. Marine Mammals in the Action Area

The proposed Test Pile Program could adversely affect the following marine mammal species under our jurisdiction:

- Beluga whale (*Delphinapterus leucas*)
- Steller sea lion (*Eumetopias jubatus*)
- Harbor seal (*Phoca vitulina richardsi*)
- Harbor porpoise (*Phocoena phocoena*)
- Killer whale (*Orcinus orca*)

1.2. Purpose and Need

The MMPA prohibits "takes" of marine mammals, with a number of specific exceptions. The applicable exception in this case is an Authorization for incidental take of marine mammals in Section 101(a)(5)(D) of the MMPA.

Section 101(a)(5)(D) of the MMPA directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if we make certain findings and provide a notice of a proposed Authorization to the public for review. Entities seeking to obtain an Authorization for the incidental take of marine mammals under our jurisdiction must submit such a request (in the form of an application) to us.

We have issued regulations to implement the Incidental Take Authorization provisions of the MMPA (50 CFR Part 216) and have produced Office of Management and Budget (OMB)-approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for Authorizations. All applicants must comply with the regulations at 50 CFR §216.104 and submit applications requesting incidental take according to the provisions of the MMPA.

Purpose: The primary purpose of our proposed action is to authorize the take of marine mammals incidental to the POA's proposed Test Pile Program. The Authorization, if issued, would exempt the POA from the take prohibitions contained in the MMPA.

To authorize the take of small numbers of marine mammals in accordance with Section 101(a)(5)(D) of the MMPA, we must evaluate the best available scientific information to determine whether the take would have a negligible impact on marine mammals or stocks and not have an unmitigable impact on the availability of affected marine mammal species for certain subsistence uses.

In addition, we must prescribe, where applicable, the permissible methods of taking and other means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat (i.e., mitigation), paying particular attention to rookeries, mating grounds, and other areas of similar significance. If appropriate, we must prescribe means of effecting the least practicable impact on the availability of the species or stocks of marine mammals for subsistence uses. Authorizations must also include requirements or conditions pertaining to the monitoring and reporting of such taking in large part to better understand the effects of such taking on the species.

Need: On November 23, 2015, the POA submitted an adequate and complete application demonstrating both the need and potential eligibility for issuance of an Authorization in connection with the activities described in Section 1.1.1. Earlier versions of the IHA application

were submitted to NMFS on February 15, 2015 and April 3, 2015. We now have a corresponding duty to determine whether and how we can authorize take by Level B harassment incidental to the activities described in the POA's application. Our responsibilities under Section 101(a)(5)(D) of the MMPA and its implementing regulations establish and frame the need for this proposed action.

Any alternatives considered under NEPA must meet the agency's statutory and regulatory requirements. Our described purpose and need guide us in developing reasonable alternatives for consideration, including alternative means of mitigating potential adverse effects. Thus, we are developing and analyzing alternative means of developing and issuing an Authorization, which may require the applicant to include additional mitigation and monitoring measures in order for us to make our determinations under the MMPA.

1.3. The Environmental Review Process

NEPA compliance is necessary for all "major" federal actions with the potential to significantly affect the quality of the human environment. Major federal actions include activities fully or partially funded, regulated, conducted, authorized, or approved by a federal agency. Because our issuance of an Authorization would allow for the taking of marine mammals consistent with provisions under the MMPA and incidental to the applicant's activities, we consider this as a major federal action subject to NEPA.

Under the requirements of NAO 216-6 section 6.03(f)(2)(b) for IHAs, we prepared this EA to determine whether the direct, indirect and cumulative impacts related to the issuance of an Authorization for incidental take of marine mammals under the MMPA during the POA's Test Pile Program in upper Cook Inlet, Alaska, could be significant. If we deem the potential impacts to be not significant, this analysis, in combination with other analyses incorporated by reference, may support the issuance of a Finding of No Significant Impact (FONSI) for the proposed Authorization.

1.3.1. Laws, Regulations, or Other NEPA Analyses Influencing the EA's Scope

We have based the scope of the proposed action and nature of the two alternatives (i.e., issue the Authorization, including prescribed means of take, mitigation measures, and monitoring requirements; or not issue the Authorization) considered in this Final EA on the relevant requirements in Section 101(a)(5)(D) of the MMPA. Thus, our authority under the MMPA bounds the scope of our alternatives. We conclude that this analysis—when combined with the analyses in the following documents—fully describes the impacts associated with the proposed Test Pile Program, including any required mitigation and monitoring measures. After conducting an independent review of the information and analyses for sufficiency and adequacy, we incorporate by reference the relevant analyses on the POA's proposed action as well as a discussion of the affected environment and environmental consequences within the following documents per 40 CFR §1502.21 and NAO 216-6 §5.09(d):

- Our notice of the proposed Authorization in the *Federal Register* (80 FR 78176, December 16, 2015);

- *Application for a Marine Mammal Protection Act Incidental Harassment Authorization for the Port of Anchorage Test Pile Program* (HDR 2015a).

- *Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion - IHA Issuance for Port of Anchorage Test Pile Project. NMFS Consultation Number: AKR-2016-9513*

MMPA APPLICATION AND NOTICE OF THE PROPOSED AUTHORIZATION

The CEQ regulations (40 CFR §1502.25) encourage federal agencies to integrate NEPA's environmental review process with other environmental review laws. We rely substantially on the public process for developing proposed Authorizations and evaluating relevant environmental information, and provide a meaningful opportunity for public participation as we develop corresponding EAs. We fully consider public comments received in response to our publication of the notice of proposed Authorization during the corresponding NEPA process.

The *Federal Register* notice on the proposed activity (80 FR 78176; December 16, 2015). requested that the public submit comments, information, and suggestions concerning the POA's request, the content of our proposed IHA, and potential environmental effects related to the proposed issuance of the Authorization. This Final EA incorporates by reference, and relies on, the POA's IHA application.

The *Federal Register* notice invited comments from the public on the proposed Authorization for 30 days. All comments received during the public period were considered in the Final EA and prior to making a final decision on whether to issue the final Authorization.

The notice of proposed Authorization published in the *Federal Register* (80 FR 78176) included the following:

- A detailed description of the proposed action as well as an assessment of the potential impacts on marine mammals and the availability of marine mammals for subsistence uses;

- Plans for the POA's mitigation and monitoring measures to avoid and minimize potential adverse impacts to marine mammals and their habitat as well as proposed reporting requirements; and

- Our preliminary findings under the MMPA.

We considered the POA's proposed Test Pile Program, as well as associated mitigation and monitoring measures, and determined that the Test Pile Program would effect the least practicable impact on marine mammals. These measures include: (1) use of soft starts or ramping up for pile driving; (2) establishment and monitoring of Level A and Level B harassment zones

by marine mammal observers (MMOs); (3) implementation of shutdown measures and harassment zones during all pile-driving operations to avoid Level A take by injury and to minimize take by Level B harassment; and (4) implementation of shutdowns for one or more beluga whales in Level B zones. Through the MMPA process, we preliminarily determined that, provided the POA implements the required mitigation and monitoring measures, the impact of the Test Pile Program would be, at worst, a temporary modification in behavior (Level B harassment) of small numbers of certain species of marine mammals. In addition, we preliminarily determined that the activity would not have an unmitigable adverse impact on the availability of marine mammals for subsistence uses.

1.3.2. Scope of Environmental Analysis

Given the limited scope of the decision for which we are responsible (i.e., issue the Authorization, including prescribed means of take, mitigation measures, and monitoring requirements; or not issue the IHA), this Final EA provides more focused information on the primary issues and impacts of environmental concern related specifically to our issuance of the IHA. This Final EA does not further evaluate effects on the elements of the human environment listed in Table 1 because we have determined through previous environmental reviews that the issuance of an IHA would not significantly affect those components of the human environment.

Table 1. Components of the human environment not affected by our issuance of an IHA

Biological	Physical	Socioeconomic/Cultural
Amphibians	Air Quality	Commercial Fishing
Humans	Geography	Military Activities
Non-Indigenous Species	Land Use	Oil and Gas Activities
Seabirds	Oceanography	Recreational Fishing
	State Marine Protected Areas	Shipping and Boating
	Federal Marine Protected Areas	National Historic Preservation Sites
	National Estuarine Research Reserves	National Trails and Nationwide Inventory of Rivers
	National Marine Sanctuaries	Low Income Populations
	Park Land	Minority Populations
	Prime Farmlands	Indigenous Cultural Resources
	Wetlands	Public Health and Safety
	Wild and Scenic Rivers	Historic and Cultural Resources
	Ecologically Critical Areas	

1.3.3. NEPA Public Process Summary

NAO 216-6 established agency procedures for complying with NEPA and the implementing NEPA regulations issued by the CEQ. Consistent with the intent of NEPA and the clear direction in NAO 216-6 to involve the public in NEPA decision-making, we requested comments on the

potential environmental impacts described in the POA's MMPA application and in the *Federal Register* notice of the proposed Authorization. The CEQ regulations further encourage agencies to integrate the NEPA review process with review under the environmental statutes. Consistent with agency practice we integrated our NEPA review and preparation of this Final EA with the public process required by the MMPA for the proposed issuance of an Authorization.

The *Federal Register* notice of the proposed Authorization, combined with our preliminary determinations, supporting analyses, and corresponding public comment period are instrumental in providing the public with information on relevant environmental issues and offering the public a meaningful opportunity to provide comments to us for consideration in both the MMPA and NEPA decision-making processes. We posted the POA's application on the internet at *http://www.nmfs.noaa.gov/pr/permits/incidental/construction.htm* concurrently with the release of the *Federal Register* notice of the proposed Authorization. The notice of the proposed Authorization was available for public review and comment from December 16, 2015 through January 15, 2016.

1.3.4. Relevant Comments on Our *Federal Register* Notice

During the 30-day public comment period, the Marine Mammal Commission (Commission) and Friends of Animals (FoA) each submitted letters. The Center for Biological Diversity (CBD) and The Humane Society of the U.S. (HSUS) submitted comments jointly. The letters are available at *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*. NMFS' responses to submitted comments are contained below.

A notice of NMFS' proposal to issue an IHA was published in the *Federal Register* on December 16, 2015 (80 FR 78176). During the 30-day public comment period, the Marine Mammal Commission (Commission) and Friends of Animals (FoA) each submitted letters. The Center for Biological Diversity (CBD) and The Humane Society of the U.S. (HSUS) submitted comments jointly. The letters are available at *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*. NMFS' responses to submitted comments are contained below.

Comment 1: The Commission, FoA, and CBD/HSUS recommended that NMFS defer issuance of incidental take authorizations and regulations until it has better information on the cause or causes of the ongoing decline of beluga whales and has a reasonable basis for determining that authorizing takes by behavioral harassment would not contribute to further decline.

Response: In accordance with our implementing regulations at 50 CFR 216.104(c), NMFS uses the best available scientific information to determine whether the taking by the specified activity within the specified geographic region will have a negligible impact on the species or stock and will not have an unmitigable adverse impact on the availability of such species or stock for subsistence uses. Based on currently available scientific evidence, NMFS determined that the impacts of the Test Pile Program would meet these standards. Moreover, POA proposed and

NMFS required a comprehensive mitigation plan to reduce impacts to Cook Inlet beluga whales and other marine mammals to the lowest level practicable.

Our analysis utilizing best available information indicates that issuance of this IHA is not expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival. The ESA Biological Opinion determined that the issuance of an IHA is not likely to jeopardize the continued existence of the Cook Inlet beluga whales or destroy or adversely modify Cook Inlet beluga whale critical habitat. Based on the analysis of potential effects and the conservative mitigation and monitoring program, NMFS determined that the activity would have a negligible impact on the population.

As additional research is conducted to determine the impact of various stressors on the Cook Inlet beluga whale population, NMFS will incorporate any findings into future negligible impact analyses associated with incidental take authorizations.

Comment 2: The Commission recommended that NMFS develop a policy that sets forth clear criteria and/or thresholds for determining what constitutes small numbers and negligible impact for the purpose of authorizing incidental takes of marine mammals.

Response: NMFS is in the process of developing both a clearer policy to outline the criteria for determining what constitutes "small numbers" and constructing an improved analytical framework for determining whether an activity will have a "negligible impact" for the purpose of authorizing takes of marine mammals. We fully intend to engage the MMC in these processes at the appropriate time.

Comment 3: The Commission recommended that NMFS draft and finalize its programmatic environmental impact statement (PEIS) on the issuance of incidental take authorizations in Cook Inlet and establish annual limits on the total number and types of takes that are authorized for sound-producing activities in Cook Inlet. FoA wrote that NMFS should prepare an environmental impact statement before issuing any IHAs.

Response: NMFS published a *Federal Register* Notice of Intent to Prepare a programmatic EIS for Cook Inlet (79 FR 61616; October 14, 2014). We are continuing the process of developing the PEIS and will consider the potential authorization of take incidental to sound producing activities. The PEIS is meant to address hypothetical increasing future levels of activity in Cook Inlet which, cumulatively, may have a significant impact on the human environment. In the interim, NMFS is evaluating each activity individually, taking into consideration cumulative impacts, with an EA, to determine if the action under consideration can support a Finding of No Significant Impact (FONSI). For this IHA, NMFS determined that the Test Pile Program will not have a significant impact on the human environment, as specified in its FONSI.

Comment 4: The Commission recommended that NMFS adopt a consistent approach when determining the potential number of takes of beluga whales in Cook Inlet for future incidental take authorization applications regarding sound-producing activities.

Response: While NMFS strives for consistency where appropriate, it is important to note that there are a number of acceptable methodologies that can be employed to estimate take. Some methodologies may be more or less suitable depending upon the type, duration, and location of a given project. Furthermore, there may be available data that are applicable only within a localized area and not across the entirety of Cook Inlet. As such, NMFS makes determinations about the best available information, including the most appropriate methodologies to generate take estimates, on an action-specific basis.

Comment 5: The Commission recommended that NMFS require POA to implement delay and shut-down procedures if a single beluga or five or more harbor porpoises or killer whales are observed approaching or within the Level B harassment zones for impact and vibratory pile driving, as has been done under recent IHAs that involved the use of airguns and sub-bottom profilers for seismic surveys, or provide sufficient justification regarding why implementation of those procedures is not necessary for the proposed activities.

Response: NMFS, after engaging in consultation under section 7 of the ESA, has modified the Level B harassment shutdown requirement that was in the proposed IHA. Rather than shutdown for groups of five or more belugas or calves observed within or approaching the maximum potential Level B harassment zones (1,359 m and 3,981 m for impact and vibratory pile driving, respectively), the IHA will require a more stringent shutdown measure. POA must shut-down upon observation of a single beluga whale within or approaching the maximum potential Level B harassment zones when driving unattenuated piles, and within a modified zone when piles are driven using sound attenuation systems. See "Mitigation" for more details of this shutdown requirement.

As described in the notice of proposed authorization, NMFS will not require POA to shut down if five or more harbor porpoises or killer whales are observed approaching or within the Level B harassment zones for impact and vibratory pile driving. The assumed benefit of such a measure is not well understood, and shutting down during these rare occurrences risks seizing of the pile, in which the pile becomes stuck in the substrate. This may result in loss of 10% of the total data from the Test Pile Program and 100% of the data from the seized pile, which would greatly reduce the Program's usefulness. Depending on which pile seized it could represent complete data loss for a certain sound attenuation treatment type (i.e. encapsulated bubble curtain and adBM resonance system). Since this data will be helpful to both POA and NMFS in the future to help assess impacts of future actions and inform development of mitigation that could have conservation value, NMFS does not want to risk losing this potentially valuable data.

Comment 6: FoA commented that NMFS is in violation of the Marine Mammal Protection Act (MMPA) since that FoA believes large numbers of beluga whales will be harassed and that significant non-negligible impacts to whales will occur. CBD/HSUS commented that the small numbers analysis and negligible impact determination were deficient.

Response: NMFS utilized the best available scientific evidence to determine whether the taking by the specified activity will have a negligible impact on the species or stock. NMFS determined that the impacts of the Test Pile Program would meet these standards.. Similarly, the Biological Opinion determined that the issuance of an IHA is not likely to jeopardize the continued existence of the Cook Inlet beluga whales or destroy or adversely modify Cook Inlet beluga whale critical habitat. Moreover, NMFS has required as part of the IHA a rigorous mitigation plan to reduce potential impacts to Cook Inlet beluga whales and other marine mammals to the lowest level practicable.

Finally, we determined the Test Pile Program would take only small numbers of marine mammals relative to their population sizes. The number of belugas likely to be taken represents less than ten percent of the population. Some of these takes may represent single individuals experiencing multiple takes. In addition to this quantitative evaluation, NMFS has also considered the seasonal distribution and habitat use patterns of Cook Inlet beluga whales and rigorous mitigation requirements to determine that the number of beluga whales likely to be taken is small. See the *Analyses and Determinations* section later in this document for more information about the negligible impact and small numbers determinations for beluga whales and other marine mammal species for which take has been authorized.

Comment 7: FoA and CBD/HSUS noted that the proposed activities would impact beluga habitat which is considered Type 1 or high value/high sensitivity habitat. FoA is also concerned that if pile driving is not completed by July of 2016, the project's activities could overlap with the time period with the largest annual beluga presence.

Response: The ensonified area during the Test Pile Program represents less than 1% of designated critical habitat in Area 1. Furthermore, the POA and adjacent navigation channel were excluded from critical habitat designation due to national security reasons (76 FR 20180, April 11, 2011).

Although POA has requested that a one-year authorization period running from April 1, 2016 through March 31, 2017, POA intends to complete all Test Pile Program activities prior to July 1, 2016. If the Program extends beyond that date, note that NMFS' analysis and determination of authorized take levels are conservative in that they are based on the density of beluga whales during the summer months when concentrations are higher. Even though POA plans to start in spring and finish early summer, should pile driving extend past July 1, the take estimates presented here would likely be conservative. Therefore, continuation of planned pile driving beyond July 1, 2016 would not affect our determinations.

Comment 8: NMFS stated that no apparent behavioral changes have been observed when belugas were sighted near construction activities including pile driving and dredging in Cook Inlet. As such, CBD/HSUS urged NMFS to obtain data on behavioral modifications in order to properly conduct its negligible impact determination. Furthermore, FoA noted that any effects may not always be visible to the naked eye or visible at all (e.g. internal injury). FoA stated that NMFS has not adequately accounted for the high mobility of beluga whales or unpredictability of being able to adequately observe these animals when the agency evaluated POA's request for an IHA and its mitigation and monitoring measures. FoA recommends that NMFS should do so before proceeding in making its decision.

Response: Available data describing behavioral impacts associated with marine noise is limited in several ways according to Southall *et al*. 2007. Insufficient data exist to support criteria other than those based on SPL alone, and this metric fails to account for the duration of exposure beyond the difference between pulse and non-pulse sounds. Additionally, there is much variability in responses among species of the same functional hearing group and also within species. Because of the influences of numerous variables, behavioral responses are difficult to predict given present information. Furthermore, any biological significance of an observed behavioral response is extremely difficult to assess (NRC, 2005). Additional research is needed to quantify behavioral reactions of a greater number of free-ranging marine mammal species to specific exposures from different human sound sources. This is an area of increasing interest and as new data becomes available NMFS will incorporate this information into future assessments.

NMFS also understands that observing every beluga whale that enters into the zones of influence may not be possible given the large size of the maximum potential vibratory pile driving Level B harassment zone (3,981 m). However, piles driven using sound attenuation systems are expected to have much smaller Level B harassment zones (approximately 300-900 m; see "Mitigation" for further detail). Additionally, POA will employ a robust monitoring program which will include marine mammal observers (MMOs) in an elevated platform and personnel on hydroacoustic monitoring vessels. MMOs will have been trained in identifying changes in behavior that may occur due to exposure to pile driving activities. Furthermore, Level A harassment (injury) is not anticipated to occur due to the shutdown protocols required of POA. Given this information NMFS is confident POA can reliably monitor beluga whales in the zones of influence and identify and record behavioral impacts.

Comment 9: FoA noted that anthropogenic noises can result in masking hindering the ability of whales to communicate. FoA also noted that anthropogenic activities can result in noise that can provoke temporary threshold shift (TTS) or permanent threshold shift (PTS) while NMFS stated in the proposed authorization that no marine mammals have been shown to experience TTS or PTS as a result of pile driving activities.

Response: NMFS acknowledged in the proposed *Federal Register* notice that masking may occur due to anthropogenic sounds occurring in frequency ranges utilized by beluga whales.

NMFS, however, believes that the short-term duration and limited affected area would not result in significant impacts from masking. NMFS wrote that although no marine mammals have been shown to experience TTS or PTS as a result of being exposed to pile driving activities, captive bottlenose dolphins and beluga whales exhibited changes in behavior when exposed to strong pulsed sounds (Finneran *et al.,* 2000, 2002, 2005). The animals tolerated high received levels of sound before exhibiting aversive behaviors. Experiments on a beluga whale showed that exposure to a single watergun impulse at a received level of 207 kPa (30 psi), which is equivalent to 228 dB, resulted in a 7 and 6 dB TTS in the beluga whale at 0.4 and 30 kHz, respectively. Thresholds returned to within 2 dB of the pre-exposure level within four minutes of the exposure (Finneran *et al.,* 2002). Although the source level of pile driving from one hammer strike is expected to be much lower than the single watergun impulse cited here, animals exposed for a prolonged period to repeated hammer strikes could receive more sound exposure in terms of SEL than from the single watergun impulse (estimated at 188 dB re 1 μPa^2-s) in the aforementioned experiment (Finneran *et al.,* 2002). However, in order for marine mammals to experience TTS or PTS, the animals have to be close enough to be exposed to high intensity sound levels for a prolonged period of time. Based on the best scientific information available, NMFS finds that with mitigation protocols in place, including a 100 meter shut-down zone, sound pressure levels (SPLs) that marine mammals might reasonably be anticipated to experience as part of the Test Pile Program are below the thresholds that could result in TTS or the onset of PTS.

Comment 10: FoA noted that NMFS did not evaluate cumulative impacts as part of its analysis. CBD/HSUS also urged NMFS to conduct an analysis of cumulative effects of construction and operation of the Anchorage Port Modernization Project (APMP).

Response: Neither the MMPA nor NMFS' implementing regulations specify how to consider other activities and their impacts on the same populations when conducting a negligible impact analysis. However, consistent with the 1989 preamble for NMFS' implementing regulations (54 FR 40338, September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into the negligible impact analysis via their impacts on the environmental baseline (*e.g.,* as reflected in the density/distribution and status of the species, population size and growth rate, and ambient noise).

In addition, cumulative effects were addressed in the EA and Biological Opinion prepared for this action. The APMP is specifically considered in the cumulative effects section of the EA. These documents, as well as the Alaska Marine Stock Assessments and the most recent abundance estimate for Cook Inlet beluga whales (Shelden *et al.,* 2015) are part of NMFS' Administrative Record for this action, and provided the decision maker with information regarding other activities in the action area that affect marine mammals, an analysis of cumulative impacts, and other information relevant to the determination made under the MMPA.

Comment 11: FoA commented that issuing the IHA would violate the Endangered Species Act as a permit (IHA) cannot be issued if taking will appreciably reduce the likelihood of survival and recovery of the species in the wild. Additionally, FoA believes that mitigation of noise and other impacts do not go far enough to fully protect the Cook Inlet beluga whales from the many threats facing them.

Response: NMFS' Biological Opinion concluded that the issuance of an IHA is not likely to jeopardize the continued existence of the Cook Inlet beluga whales or destroy or adversely modify Cook Inlet beluga whale critical habitat. NMFS has revised its IHA requirements to require shutdown upon observation of one beluga whale within or approaching the area expected to contain sound exceeding NMFS' criteria for Level B harassment. See response to comment #8. NMFS acknowledges the difficulties of monitoring in the field, particularly at long distances. However, NMFS believes the required mitigation and related monitoring satisfy the requirements of the MMPA.

Comment 12: FoA stated that issuing the IHA would violate NEPA as NMFS did not prepare an EIS.

Response: The purpose of an EA is to evaluate the environmental impacts of an action and determine if a proposed action or its alternatives have potentially significant environmental effects. The EA process concludes with either a Finding of No Significant Impact or a determination to prepare an Environmental Impact Statement. NMFS issued a Finding of No Significant Impact (FONSI) detailing the reasons why the agency has determined that the action will have no significant impacts.

Comment 13: FoA commented that NMFS must include a discussion of ethics and the rights of wildlife when assessing the potential harassment of marine life.

Response: NMFS' does not have authority under section 101(a)(5)(D) of the MMPA to consider these issues in making a decision. As enacted by Congress, our only authority under that provision is to evaluate the specified activity to determine if it will have a negligible impact on the affected species or stocks and no unmitigable adverse impact on marine mammal availability for relevant subsistence uses. If those standards are met and the expected take is limited to small numbers of marine mammals, NMFS must issue an IHA that contains the required mitigation, monitoring, and reporting requirements.

Comment 14: CBD/HSUS recommended that NMFS issue and finalize a draft recovery plan as is required under the Endangered Species Act (ESA) and not issue an IHA until this has occurred.

Response: The Cook Inlet Beluga Whale Recovery Plan is currently under development and NMFS is working towards its completion. A final recovery plan is not required for issuance of the IHA.

Comment 15: CBD/HSUS urged NMFS not to issue an IHA until the agency adopts a comprehensive monitoring plan.

Response: The commenter did not explain what it meant by "comprehensive monitoring plan." However, NMFS has conducted aerial monitoring surveys of beluga whales in Cook Inlet on an annual basis since 1993 and this monitoring is likely to continue in the foreseeable future. Furthermore, an important component of the Draft Cook Inlet Beluga Whale Recovery Plan includes comprehensive population monitoring. Under the draft recovery plan, NMFS would continue to conduct aerial and photo-identification surveys to estimate abundance, and analyze population trends, calving rates, and distribution.

Comment 16: CBD/HSUS argue that NMFS improperly estimated take by using data from only summer months when the IHA is authorized for a one-year period. CBD/HSUS also allege that NMFS underestimated the size of the group factor which was included in the final take estimation.

Response: The predictive beluga habitat model described in Goetz *et al*. 2012 was used by POA and NMFS to estimate density. This is considered to be the best information available, and incorporates National Marine Mammal Laboratory data collected during the months of June and July between 1994 and 2008. There is no data of similar quality available for the spring and early summer time frame. The authorized take estimates for the Test Pile Program were based on the assumption that pile-driving operations would take place between April 1 and July 1, 2016 and that beluga density outside the June-July period would be lower. Therefore, NMFS considers the use of the Goetz *et al.* 2012 summer data to estimate take for the April 1 through July 1 period to be conservative and appropriate.

The section on *Estimated Take by Incidental Harassment* later in this document explains why the density data used for estimating potential beluga exposures does not fully reflect the nature of local beluga occurrence and also provides a statistically defensible justification for the size of the large group factor which was selected by NMFS. Note that while larger groups of beluga whales have frequently been observed in Cook Inlet, NMFS' finding is based on groups that were actually observed near POA.

Comment 17: CBD/HSUS stated that it is inappropriate for NMFS to use the current, outdated, generic sound thresholds of 180 dB and 160/120dB levels (impact/non-impact) as thresholds for Level A and Level B harassment when it has already developed a more appropriate method. As such, the agency should not issue IHAs until it has completed its revision of acoustic thresholds for Level B take.

Response: NMFS currently uses 160 dB root mean square (rms) as the exposure level for estimating Level B harassment takes from impulse sounds for most species in most cases. This threshold was established for underwater impulse sound sources based on measured avoidance responses observed in whales in the wild. Specifically, the 160 dB threshold was derived from

data for mother-calf pairs of migrating gray whales (Malme *et al.*, 1983, 1984) and bowhead whales (Richardson *et al.*, 1985, 1986) responding to seismic airguns (*e.g.*, impulsive sound source). We acknowledge there is more recent information bearing on behavioral reactions to seismic airguns, but those data only illustrate how complex and context-dependent the relationship is between the two. The 120 dB re 1µPa (rms) threshold for noise originates from research on baleen whales, specifically migrating gray whales (Malme *et al.* 1984; predicted 50% probability of avoidance) and bowhead whales reacting when exposed to industrial (*i.e.*, drilling and dredging) activities (non-impulsive sound source) (Richardson *et al.* 1990).NMFS is working to develop guidance to help determine Level B harassment thresholds. Note, however, it is not a matter of merely replacing the existing threshold with a new one. Due to the complexity of the task, any guidance will require a rigorous review that includes internal agency review, public notice and comment, and additional external peer review before any final product is published. In the meantime, and taking into consideration the facts and available science, NMFS determined it is reasonable to use the 160 dB threshold for impact sources for estimating takes of marine mammals in Cook Inlet by Level B harassment and the 120 dB threshold for vibratory sources.

With regard to injury, NMFS is developing *Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing*. Specifically, it will identify the received levels, or acoustic thresholds, above which individual marine mammals are predicted to experience changes in their hearing sensitivity (either temporary or permanent) for acute exposure to underwater anthropogenic sound sources. That Guidance is undergoing an extensive process involving peer review and public comment, and is expected to be finalized sometime in 2016. See 80 FR 45642 (July 31, 2015).

1.4. Other Permits, Licenses, or Consultation Requirements

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action.

1.4.1. National Environmental Policy Act

Issuance of an Authorization is subject to environmental review under NEPA. NMFS may prepare an EA, an EIS, or determine that the action is categorically excluded from further review. While NEPA does not dictate substantive requirements for an Authorization, it requires consideration of environmental issues in federal agency planning and decision making. The procedural provisions outlining federal agency responsibilities under NEPA are provided in the CEQ's implementing regulations (40 CFR §1500-1508).

1.4.2. Endangered Species Act

Section 7 of the Endangered Species Act (ESA) and implementing regulations at 50 CFR §402 require consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that "may affect" a listed species or critical habitat. NMFS'

issuance of an Authorization affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these Section 7 consultation requirements. Accordingly, NMFS is required to ensure that its action is not likely to jeopardize the continued existence of any threatened or endangered species, or result in destruction or adverse modification of critical habitat for such species.

There are two marine mammals under NMFS' jurisdiction listed as endangered under the ESA with confirmed or possible occurrence in the proposed project area (i.e., upper Cook Inlet): the Cook Inlet Distinct Population Segment (DPS) of the beluga whale and the western DPS of the Steller sea lion. Although critical habitat for the Cook Inlet beluga whale exists within Cook Inlet, the Test Pile Program falls within the Beluga Critical Habitat Exclusion Area.

The POA transmitted a Biological Assessment (BA) to NMFS on April 9, 2015. A Biological Opinion was issued by NMFS and is posted at h*ttp://www.nmfs.noaa.gov/pr/permits/incidental/construction.htm.* NMFS determined that while the proposed action may affect Cook Inlet beluga whales and the WDPS of Steller sea lions, it is not likely to jeopardize their continued existence.

1.4.3. Marine Mammal Protection Act

The MMPA and its provisions that pertain to the proposed action are discussed above in Section 1.2.

1.4.4. Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect essential fish habitat (EFH) identified under the MSFCMA.

The North Pacific Fishery Management Council (NPFMC) identifies habitat in Cook Inlet as essential for Pacific salmon and groundfish species (NPFMC 2012, 2014). Estuarine and marine waters in the vicinity of the POA provide EFH for Chinook (*Oncorhynchus tshawytscha*), chum (*O. keta*), coho (*O. kisutch*), sockeye (*O. nerka*), and pink salmon (*O. gorbuscha*); Pacific cod (*Gadus macrocephalus*); walleye pollock (*Theragra chalcogramma*); and sculpin species (*Cottidae* spp.). While data are insufficient to describe EFH for eulachon[1] (*Thaleichthys pacificus*) and other species in the forage fish complex (NPFMC 2014), eulachon occur in the vicinity of the POA (Houghton *et al.* 2005) and are a common prey species for the Cook Inlet beluga whale (Moore *et al.* 2000).

[1] Eulachon are also locally referred to as "hooligan" and "candlefish." A personal use and small commercial fishery for eulachon occurs nearby in Knik Arm.

While the Knik Arm of Cook Inlet is considered EFH for nine fish species, not all nine species are anticipated to occur in waters adjacent to the POA during the proposed work window. Based on species life histories, habitat preferences, and results of sampling in Knik Arm (Houghton *et al.* 2005), the Test Pile Program would not be anticipated to affect eulachon, Pacific cod, walleye pollock, or Pacific staghorn sculpin because these fish are generally not likely to be present in waters near the POA during the proposed work window. Eulachon presence would be anticipated during spawning migrations in April, May, and June. The three groundfish species have been documented in the Knik Arm in low numbers and only infrequently.

The POA transmitted an EFH Assessment to the U.S. Army Corps of Engineers (USACE) on April 2, 2015. The USACE issued an Agency coordination letter on May 21, 2015 and preliminarily determined there would be no effect on EFH. NMFS similarly determined that the effects on EFH by the project and issuance of the Authorization assessed here would be temporary and minor. The main effect would be short-term disturbance that might lead to temporary and localized relocation of the EFH species or their food. The actual physical and chemical properties of the EFH will not be impacted. Therefore, NMFS, Office of Protected Resources, Permits and Conservation Division has determined that the issuance of an IHA for the taking of marine mammals incidental to the pile installation will not have an adverse impact on EFH, and an EFH consultation is not required.

1.4.5. River and Harbors Act (Section 10 permit)/ Section 404 Permit

Under the Rivers and Harbors Act of 1899, a Section 10 permit is required for any work in, over, or under navigable waters of the United States that would impact their course, location, condition, or capacity. This includes any construction of piers, breakwaters, bulkheads, jetties, weirs, and intake structures; work such as dredging or disposal of dredged material; and excavation, filling, or other modifications to navigable waters of the United States.

When wetlands or jurisdiction waters of the United States are affected by construction activities or the discharge of dredged or fill material, a Section 404 permit is required under the Clean Water Act.

A Department of the Army Section 10 permit application was submitted to the USACE on April 2, 2015. The USACE distributed a 15-day agency coordination letter on May 21, 2015 describing the Agency's intent to issue a Letter of Permission. USACE will issue the Letter of Permission after the Biological Opinion is completed and the final IHA is issued.

1.4.6. National Historic Preservation Act

Under the National Historic Preservation Act (NHPA) of 1966, as amended, a Section 106 review and consultation process with the State Historic Preservation Officer (SHPO) is required for all federal projects and projects requiring federal permits. The NHPA requires that responsible federal agencies comply with the procedures for consultation and comment issued by the Advisory Council on Historic Preservation when taking an action that could affect properties

listed, or eligible for listing, on the National Register of Historic Places for their historic, architectural, archaeological, or cultural value.

The latest published version of the Alaska Heritage Resources Survey has been consulted for the presence or absence of historic properties, including those listed in or eligible for inclusion in the National Register of Historic Places. There are unevaluated properties in the vicinity of the worksite. SHPO had no response to an agency coordination issued by the USACE on May 21, 2015, which indicates no significant historic properties would be impacted by the project.

Chapter 2 Alternatives

2.1. Introduction

NEPA and the implementing CEQ regulations (40 CFR §1500-1508) require consideration of alternatives to proposed major federal actions, and NAO 216-6 provides agency policy and guidance on the consideration of alternatives to our proposed action. An EA must consider all reasonable alternatives, including the No Action Alternative, even if it that alternative does not meet the stated purpose and need. This provides a baseline analysis against which we can compare the other alternatives.

To warrant detailed evaluation as a reasonable alternative, an alternative must meet our purpose and need. In this case, as we explained in Chapter 1 of this EA, an alternative only meets the purpose and need if it satisfies the requirements under Section 101(a)(5)(D) of the MMPA. We evaluated each potential alternative against these criteria; identified one action alternative along with the No Action Alternative; and carried these forward for evaluation in this EA.

Alternative 1 includes mitigation measures intended to minimize any potentially adverse effects to marine mammals. This chapter describes the alternatives and compares them in terms of their environmental impacts and their achievement of objectives.

2.2. Description of the Port of Anchorage's Proposed Test Pile Program

We presented a general overview of the POA's Test Pile Program in our *Federal Register* notice of proposed Authorization (80 FR 78176, December 16, 2016). We incorporate those descriptions by reference in this EA and briefly summarize them here.

The POA is identifying and updating plans for modernizing its facilities through the APMP. An initial step in the APMP is implementation of a Test Pile Program, the proposed action for the IHA application. The proposed Test Pile Program would install 10 indicator test piles (shown in **Error! Reference source not found.**), gather geotechnical data near test pile locations, test itigation applications (e.g., pile cushion, encapsulated bubble curtain, and resonator system), and measure in-water sound propagation parameters (e.g., transmission loss, water depth) during pile installation.

Most of the pile-driving activities would occur in waters about 30 to 50 feet deep or less, and will be adjacent to the existing terminal deck. Installation of the indicator piles would involve driving the piles with a combination of a vibratory hammer and an impact hammer, or with only an impact hammer. Three of the ten indicator piles would remain in place following installation for possible future use as part of the APMP. The remaining seven indicator piles would be cut off at or below the mudline after installation. Geotechnical and sound propagation data collected during piling installation would be integrated into the design, construction, and environmental permit planning for the proposed APMP.

In conjunction with the test pile installation, a hydroacoustic monitoring program would test the effectiveness of sound attenuation measures such as encapsulated bubble curtains and the adBM resonance system. Results from the hydroacoustic monitoring during the Test Pile Program would then be used to assist in design decisions as well as to develop monitoring and mitigation methods to reduce impacts to marine mammals from future APMP activities.

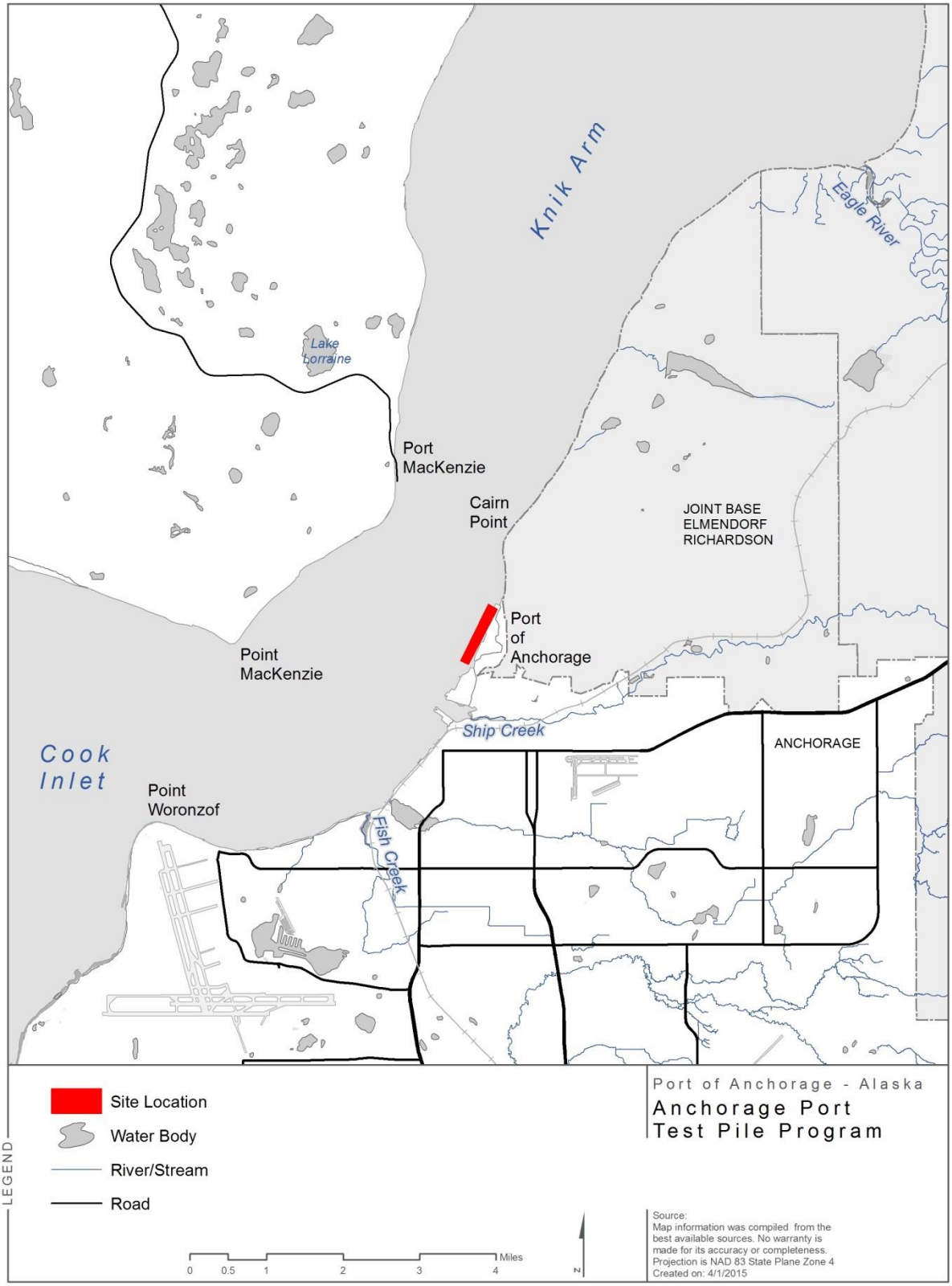

Figure 1. Site location and vicinity

2.2.1. Dates and Duration

The POA plans for pile driving to take place from April 1, 2016 through July 1, 2016. However, due to potential unforeseeable circumstances, authorization for the Test Pile Program is requested for the 1-year period from April 1, 2016 to March 31, 2017.

The POA anticipates the indicator pile-load driving would take approximately 21 days for the 10 piles. Seven of the 10 piles would be removed at the mudline afterwards. After being allowed to settle for approximately 2 to 3 weeks, the three remaining piles would be re-struck over a 4-day period. The combined total number of days of pile driving and re-striking would be approximately 25 days.

A 25 percent contingency has been added to the estimates stated above to account for schedule delays due to weather or marine mammal shutdowns. Due to these and other constraints, the total days needed for pile driving will likely not occur consecutively. With the contingency, the Test Pile Program will require approximately 26 days of actual pile driving, spread as necessary throughout the scheduled project timeline. Re-striking would take approximately 40 minutes, spread as necessary throughout the scheduled timeline.

Table 2 shows a conceptual project schedule for test pile driving. Due to the possibility of unforeseen construction delays (e.g., inclement weather, equipment issues, etc.), the project is being permitted for a 1-year period, beginning April 1, 2016 and ending on March 31, 2017. As shown in Table 2, the actual number of hours spent pile driving (including the added contingency) would be distributed over a period of approximately 31 days (4 weeks).

Table 2. Estimated project schedule for Test Pile Program

	Number of Hours		Number of days		
	Vibratory Driving	**Impact Driving**	**Pile Driving** [a]	**Restrikes**	**TOTAL**
10 indicator piles	5	17	21	4	25
	+25 percent contingency				
TOTAL	**6**	**21**	**26**	**5**	**31**

[a] Within the proposed number of days for pile driving, the actual number of vibratory drilling hours is approximately 5 hours; the actual number of impact driving hours is approximately 17 hours. The other remaining hours would allow for mobilization and de-mobilization of equipment. Some pile-driving days would require an hour or less of pile driving.

2.2.2. Specified Geographic Area

The POA sits in the industrial waterfront of Anchorage, just south of Cairn Point and north of the mouth of Ship Creek. The project site is located within Sections 6 and 7, Township 13 North, Range 3 West, Seward Meridian; U.S. Geological Survey Quadrangle Map Anchorage A-8; Latitude 61° 15' North, Longitude 149° 52' West. Pile-driving activities would occur in waters about 40 to 60 feet deep or less, and seven indicator piles would be adjacent to the existing

terminal deck (**Error! Reference source not found.**). The other three indicator piles would be nstalled to the southwest of the existing facilities (**Error! Reference source not found.**).

2.2.3. Detailed Description of Activities

The POA's Test Pile Program consists of the following activities, as further detailed below:

- Install 10 indicator test piles;
- Gather geotechnical data near test pile locations;
- Test mitigation measures (e.g., encapsulated bubble curtain, and resonator system); and
- Measure in-water sound propagation parameters (e.g., source level, transmission loss, water depth) during pile installation.

Pile-Driving Operations and Indicator Pile-load Tests

Indicator pile-load testing involves monitoring the installation of prototype piles as they are driven into the ground. Ten 48-inch piles, spread over six locations adjacent to the existing POA facilities, will be driven for these tests. The indicator piles will provide representative installation and capacity data, and enable hydroacoustic measurements in water depths and locations that will closely approximate production locations for the future pier-head line. The indicator piles will be vibrated and impact-driven to depths approximately 145 feet below the mud line from a large derrick barge.

During the Test Pile Program, the contractor will mobilize cranes, tugs, and floating barges, including one derrick barge up to 70 feet wide by 200 feet long. These barges will be moved into location with a tugboat. Cranes will be used to conduct overwater work from barges, which are anticipated to remain on-site for the duration of the Test Pile Program. The barge will not be grounded at any time, but rather anchored in position using a combination of anchor lines and spuds (two to four, depending on the barge). The derrick barge will require approximately 12 feet of water under the barge bottom.

Installation of the piles will involve driving each pile with a combination of a vibratory hammer and an impact hammer, or with only an impact hammer. It is estimated that vibratory installation of each pile will require approximately 30 minutes. For impact pile driving, pile installation is estimated to require between 80 to 100 minutes per pile, requiring 3,200 to 4,375 pile strikes. Pile driving will be halted during installation of each pile as additional pile sections are added. These shutdown periods will range from a few hours to a day in length to accommodate welding and inspections.

Figure 2. Approximate indicator pile locations for the Test Pile Program

Geotechnical Characterization

Geotechnical characterization work will be conducted independent of the test pile driving and will provide data on marine substrates in the future APMP development area. The POA proposes to complete geotechnical sampling at five overwater locations to support the design and construction of the APMP. Explorations will be conducted from the edge of the existing terminal wharf. The decision on whether to use a barge or the existing wharf will be made on the basis of access to the locations, tide and current constraints, and costs.

Exploration equipment comprised of either a rotary drill rig or Cone Penetrometer Test (CPT) system will be used to perform the geotechnical sampling. Methods used to conduct the sampling are described below.

- At each of the five geotechnical sampling locations, borings approximately 4 to 6 inches in diameter will be drilled to depths of 200 feet or more below the mudline by using a rotary mud drill rig.
- Each boring will be drilled within a hollow 12-inch-diameter casing that extends from the barge or wharf to approximately 10 to 15 feet below the mudline. The casing separates the drilling accessories and samples from the aquatic environment to control and contain fluids and sediment.
- The casing will be connected directly to either the barge or wharf, as applicable, and will prevent any materials from being discharged into waters of the United States.
- Soil samples will be collected at 5- to 10-foot intervals during the exploration. The sampling sequence will involve rotary drilling for 5 or 10 feet, and then obtaining a soil sample using either a thin-wall sampling tube or a Standard Penetration Test sampler.
- CPT soundings may be conducted at some locations to obtain a semi-continuous plot of soil resistance to penetration of a nominal 1.5- to 2-inch-diameter rod. Information from the CPT sounding is used to interpret soil types and estimate engineering properties of the soil.
- Rods will be pushed to the point of refusal, which is anticipated to be approximately 150 feet below the mudline, depending on conditions.
- Rods will be enclosed within casings of the same type used for the geotechnical sampling, and removed completely when testing is complete.

Hydroacoustic Monitoring Program and Sound Attenuation

Sound attenuation measures will be used to test for achieved attenuation during pile-driving operations. The POA plans to test attenuation associated with the use of an encapsulated bubble curtain and resonance-based system; however, the currents in the project area may preclude

bubble curtain use if curtain frames cannot be stabilized during testing. If possible, the sound attenuation measures will be applied during specific testing periods, and then intentionally removed to allow comparison of sound levels during the driving of an individual pile. In this way, the sound signature of an individual pile can be compared with and without an attenuation device, avoiding the confounding factor of differences among piles. If sound attenuation measures cannot easily be added and removed, then different piles with and without sound attenuation measures will be compared. Data collected from sound attenuation testing will inform future construction of the APMP. The POA will monitor hydroacoustic levels, as well as the presence and behavior of marine mammals during pile installation.

2.3. Description of Alternatives

2.3.1. Alternative 1 – Issuance of an Authorization with Mitigation Measures

The Proposed Action constitutes Alternative 1 and is the Preferred Alternative. Under this alternative, we would issue an Authorization (valid from April 1, 2016 through March 31, 2017) to the POA allowing the incidental take, by Level B harassment, of five species of marine mammals, subject to the mandatory mitigation and monitoring measures and reporting requirements set for in the proposed Authorization, if issued, along with additions based on consideration of public comments.

PROPOSED MITIGATION AND MONITORING MEASURES

We must prescribe the means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat. In order to do so, we must consider the POA's proposed mitigation measures, as well as other potential measures, and assess how such measures could benefit the affected species or stocks and their habitat. Our evaluation of potential measures includes consideration of the following factors in relation to one another: (1) the manner in which, and the degree to which, we expect the successful implementation of the measure to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

Any additional mitigation measure proposed by us beyond what the applicant proposes should be able to, or have a reasonable likelihood of accomplishing or contributing to, the accomplishment of one or more of the following goals:

- Avoidance or minimization of marine mammal injury, serious injury, or death wherever possible;
- A reduction in the numbers of marine mammals taken (total number or number at biologically important time or location);

- A reduction in the number of times the activity takes individual marine mammals (total number or number at biologically important time or location);
- A reduction in the intensity of the anticipated takes (either total number or number at biologically important time or location);
- Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time; and
- For monitoring directly related to mitigation, an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

To reduce the potential for disturbance from acoustic stimuli associated with impact and vibratory driving activities, the POA has proposed to implement several monitoring and mitigation measures for marine mammals. There will be 4 marine mammal observers (MMOs) whose duties are outlined in the final IHA. NMFS has proposed some additional measures. The proposed monitoring and mitigation measures are discussed below.

(1) **Soft Start for Pile Driving Activities.** A ''soft start,'' or ramping up technique, will be used at the beginning of each pile installation to allow any marine mammal that may be in the immediate area to leave before pile driving reaches full energy. The soft start requires pile-driving operators to initiate noise from vibratory hammers for 15 seconds at reduced energy followed by a 1-minute waiting period. The procedure will be repeated two additional times. If an impact hammer is used, operators will be required to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 1-minute waiting period, then two subsequent three-strike sets. If any marine mammal is sighted within the 100-meter shutdown zone prior to pile driving, or during the soft start, the hammer operator (or other authorized individual) will delay pile driving until the animal moves outside the safety zone. Furthermore, if marine mammals are sighted within a Level B harassment zone prior to initiation of pile driving, operations will be delayed until the animals move outside the Level B harassment zone in order to avoid take. Pile driving will resume only after a qualified observer determines that the marine mammal has moved outside the shutdown or harassment zone, or after 30 minutes have elapsed since the last sighting of the marine mammal within the shutdown or harassment zone.

(2) **Shutdown Measures and Harassment Zones.** Estimated distances to the 190 decibel (dB), 180 dB, 160 dB, and 125 dB isopleths for unattenuated impact and vibratory pile driving for 48-inch steel shell piles were determined as 14, 63, 1,359 and 3,981 meters, respectively. For attenuated pile driving assuming a 10 dB

reduction in noise levels, isopleths were identified as <10, 13, 293, and 858 meters respectively.

Based on the sound levels predicted for pile driving, the POA is proposing a 100-meter "shutdown" zone during all pile-driving operations to prevent Level A take by injury, and to minimize take by Level B harassment.

(3) **Shutdown for One or More Beluga Whales During Driving of Unattenuated Piles.** To reduce the chance of the POA reaching or exceeding authorized take, and to minimize harassment to beluga whales, in-water pile driving operations will be shut down if one or more beluga whales is sighted approaching 1,400 m and 4000 m for impact and vibratory driving respectively, closely corresponding to the calculated Level B harassment 160 dB and 125 dB isopleths (1,359 m and 3,981 m) during driving of the two unattenuated piles. If the whale or group of whales is not re-sighted within 30 minutes, pile driving may resume.

(4) **Shutdown for One or More Beluga Whales During Driving of Attenuated Piles.** To reduce the chance of the POA reaching or exceeding authorized take, and to minimize harassment to beluga whales, in-water pile driving operations will be shut down if one or more beluga whales is sighted approaching 300 m and 900 m for impact and vibratory driving respectively, closely corresponding to the calculated Level B harassment 160 dB and 125 dB isopleths (293 m and 858 m) during driving of the eight attenuated piles. These piles will be subjected to sound attenuation treatments including encapsulated bubble curtains or the adBM resonance system. These systems have been shown to mitigate sound levels. NMFS will assume that these systems will provide at least 10 dB noise reduction resulting in the decreased radii of these Level B harassment zones. If the whale or group of whales is not re-sighted within 30 minutes, pile driving may resume.

(5) **Pile Driving Weather Delays.** Pile driving will only take place when the Level A shutdown and Level B harassment zones are visible in their entirety to the marine mammal observers. Heavy rain, snowfall, fog, and darkness will necessitate a shutdown of pile-driving activities during periods of time when the Level A shutdown and Level B harassment zones are not fully visible. High wind speeds can also impact visibility by creating waves and whitecaps that inhibit an observer's ability to spot marine mammals, and will necessitate a shutdown of pile driving.

(6) **Time Restrictions.** Work would occur only during daylight hours, when visual monitoring of marine mammals can be conducted.

PROPOSED REPORTING MEASURES

After conclusion of the Test Pile Program (which includes the completion of hydroacoustic and marine mammal monitoring), a draft technical report of all data collected and summarized from all monitoring locations will be submitted to NMFS within 90 days after the end of the authorization or 60 days prior to the start of any subsequent authorizations. The results will be summarized in graphical form and include summary statistics and time histories of impact sound values for each pile. A final report will be prepared and submitted to NMFS within 30 days following receipt of comments on the draft report from NMFS, and will include:

- Size and type of piles
- A detailed description of the type of noise attenuation device, including design specifications, if applicable
- The make and model of the impact hammer used to drive the piles and its energy rating
- A description of the sound-monitoring equipment
- The distance between hydrophones and/or microphone and pile
- The depth of the hydrophones and depth of water at hydrophone locations
- The distance from the pile to the water's edge
- The range of water depth in which the pile was driven
- The depth into the substrate that the pile was driven
- The physical characteristics of the bottom substrate into which the piles were driven
- The total number of strikes to drive each pile and for all piles driven during a 24-hour period
- The results of the hydroacoustic monitoring
- The distances at which root mean square (rms) values exceed the respective threshold values
- Vibratory monitoring results
- A description of any observable marine mammal behavior in the immediate area and, if possible, correlation to underwater sound levels occurring at that time
- An analysis of detectability of marine mammals, species and numbers observed, sighting rates and distances, and behavioral reactions within and outside harassment zones

- A refined take estimate based on the number of marine mammals observed in the harassment zones; this may be reported as either a rate of take (number of marine mammals per hour) or take based on density (number of individuals within the area)

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this Authorization, such as an injury (Level A harassment) or serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), the POA shall immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, his/her designees, and the Alaska Regional Stranding Coordinators. The report must include the following information:

(1) Time, date, and location (latitude/longitude) of the incident;

(2) The name and type of vessel involved;

(3) The vessel's speed during and leading up to the incident;

(4) Description of the incident;

(5) Status of all sound source use in the 24 hours preceding the incident;

(6) Water depth;

(7) Environmental conditions (e.g., wind speed and direction, wave height, cloud cover, and visibility);

(8) Description of marine mammal observations in the 24 hours preceding the incident;

(9) Species identification or description of the animal(s) involved;

(10) The fate of the animal(s); and

(11) Photographs or video footage of the animal (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with the POA to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. The POA may not resume their activities until notified by NMFS via letter, email, or telephone.

In the event that the POA discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), the POA would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, his/her designees, and the NMFS Alaska Stranding Hotline. The report must include the same information listed above. Activities may continue

while NMFS reviews the circumstances of the incident. NMFS would work with the POA to determine whether modifications in the activities are appropriate.

In the event that the POA discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the authorized activities (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the POA shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, his/her designees, the NMFS Alaska Stranding Hotline, and the Alaska Regional Stranding Coordinators within 24 hours of the discovery. The POA shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Activities may continue while NMFS reviews the circumstances of the incident.

In our proposed authorization (80 FR 78176; December 16, 2015), which we incorporate by reference, we preliminarily determined that the measures included in the proposed Authorization were sufficient to reduce the effects of the POA's proposed Test Pile Program on marine mammals to the level of least practicable adverse impact. In addition, we described our analysis of impacts and preliminarily determined that the taking of small numbers of marine mammals incidental to the POA's proposed Test Pile Program would have a negligible impact on the relevant species or stocks and would not have an unmitigable adverse impact on affected species or stocks for taking for subsistence uses. Accordingly, this Preferred Alternative would satisfy the purpose and need of our proposed action under the MMPA: issuance of Authorizations, along with required mitigation measures and monitoring that meets the standards set forth in Section 101(a)(5)(A) of the MMPA and the implementing regulations. These proposed mitigation, monitoring, and reporting measures may change based on public comments received on the proposed Authorization and/or this Final EA.

2.3.2. Alternative 2 – No Action Alternative

We are required to evaluate the No Action Alternative per CEQ NEPA regulations. The No Action Alternative serves as a baseline to compare the impacts of the Preferred and other alternatives. Under the No Action Alternative, we would not issue the requested Authorization to the POA for the proposed Test Pile Program.

Under the No Action Alternative, the POA could choose not to proceed with their proposed activities or to proceed without an Authorization. If they choose the latter, the POA would not be exempt from the MMPA prohibitions against the take of marine mammals and would be in violation of the MMPA if take of marine mammals occurs.

For purposes of this EA, we characterize the No Action Alternative as the POA not receiving an Authorization and the POA conducting the Test Pile Program without the protective measures and reporting requirements required by an Authorization under the MMPA. We take this

approach to evaluate the impact on marine mammals from these activities in the absence of protective measures.

Chapter 3 Affected Environment

This chapter describes existing conditions in the proposed action area. Complete descriptions of the physical, biological, and social environment of the action area are contained in the proposed authorization *Federal Register* notice (80 FR 78176). We incorporate those descriptions by reference and briefly summarize or supplement the relevant sections for marine mammals in the following subsections.

3.1. Physical Environment

We are required to consider impacts to the physical environment under NOAA NAO 216-6. As discussed in Chapter 1, our proposed action and alternatives relate only to the authorization of incidental take of marine mammals and not to the physical environment. Certain aspects of the physical environment are not relevant to our proposed action (see Section 1.3.2)..

3.1.1. Marine Mammal Habitat

We presented information on marine mammal habitat and the potential impacts to marine mammal habitat in the proposed authorization *Federal Register* notice. In summary, beluga whales and harbor seals use the waters of upper Cook Inlet for foraging, calving and pupping, and other important life history functions. The mouths of rivers are important beluga whale feeding habitat. Harbor seals use coastal haul-outs in upper Cook Inlet, including mud flats near river mouths. Harbor porpoises are found in upper Cook Inlet in low numbers. Species that may be encountered infrequently or rarely within the project area include killer whales and Steller sea lions. Killer whales have been documented preying on beluga whales in upper Cook Inlet; however, they have not been observed during POA construction or scientific monitoring. A Steller sea lion was observed near the POA in 2009.

Pursuant to the ESA, critical habitat has been designated for Cook Inlet beluga whales. The Cook Inlet beluga whale is the only ESA-listed marine mammal entity in the vicinity of the project area that has critical habitat designated in Cook Inlet.[2] Knik Arm is Type 1 habitat for the Cook Inlet beluga whale, which means it is the most valuable, used intensively by beluga whales from spring through fall for foraging and nursery habitat. However, the area in the vicinity of proposed POA Test Pile Program was excluded from the critical habitat designation due to national security concerns (**Error! Reference source not found.**).

[2] There is critical habitat for Steller sea lions, but it does not occur near the POA Test Pile Program action area or in upper Cook Inlet.

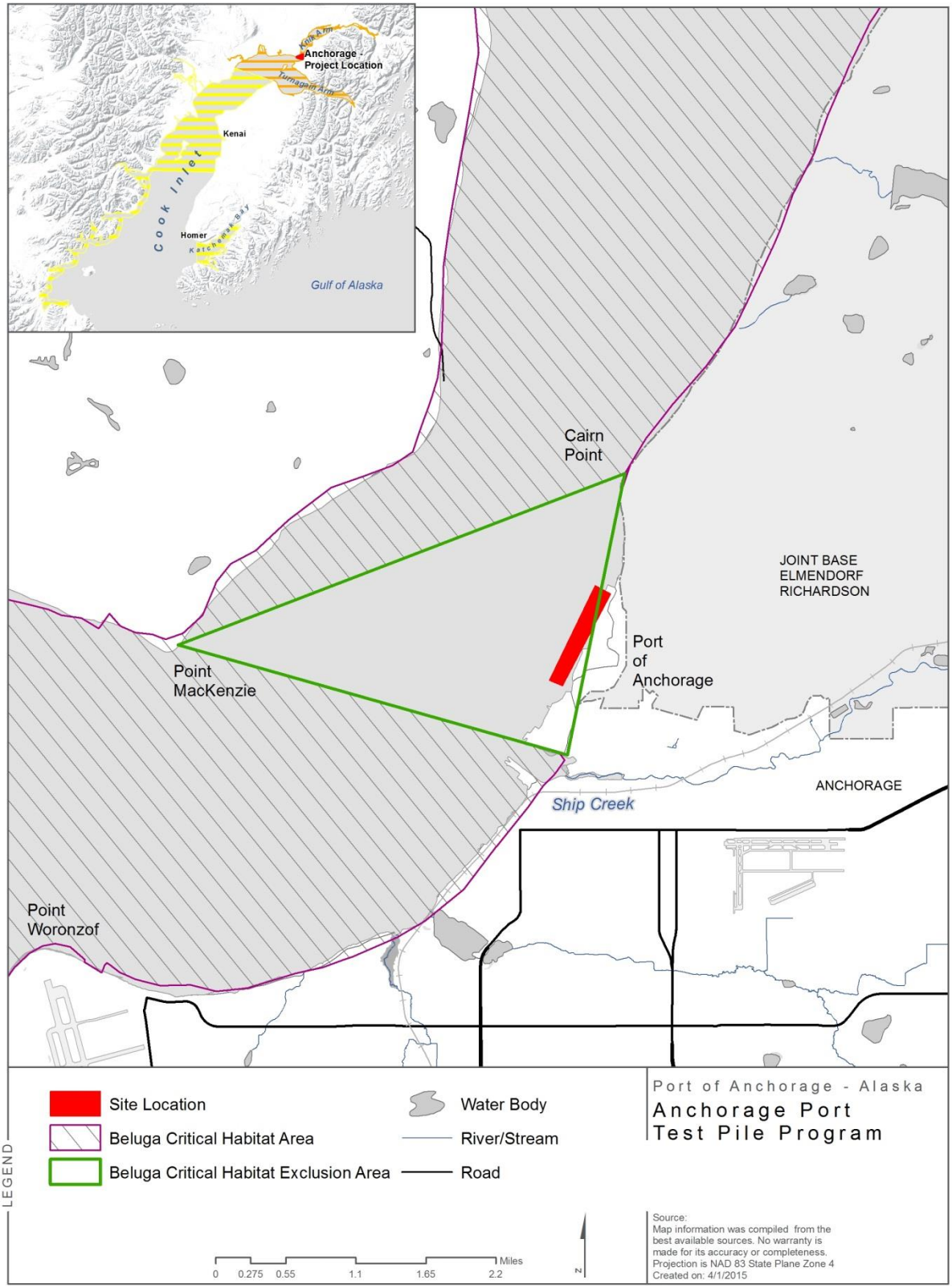

Figure 3. Beluga whale critical habitat and exclusion zone

3.1.2. Ambient Sound/Acoustical Environment

In Knik Arm, marine mammals are exposed to natural and anthropogenic sounds. Though much of upper Cook Inlet is a poor acoustic environment, characterized by shallow depth, sand/mud bottoms, and high background noise from currents and glacial silt (Blackwell and Greene 2002), vessel use and in-water construction have affected baseline acoustic conditions for marine mammals.

Ambient noise is background noise that is comprised of many sources from multiple locations (Richardson *et al.* 1995a). Background sound levels measured in 2008 at the POA Marine Terminal Redevelopment Project (MTRP) site ranged from 125 to 155 dB referenced to 1 microPascal (dB re 1 µPascal; SFS 2008). These measurements included industrial sounds from maritime operations, but ongoing USACE maintenance dredging and pile driving from construction were not underway at the time of the study. Background sound levels measured at the POA during an underwater survey conducted for the POA in 2007 (URS 2007) recorded highly variable sound pressure levels, ranging from 105 to 135 dB. Most sound pressure level recordings exceeded 120 dB. Noise levels in excess of 135 dB occurred during periods of strong currents, water flow and strumming (KABATA 2011). These levels are consistent with other measurements conducted in Cook Inlet by Blackwell (2005). The lower range of broadband (10 to 10,000 Hertz [Hz]) background sound levels obtained during underwater measurements at Port MacKenzie, located across Knik Arm from the POA, ranged from 115 dB to 133 dB (Blackwell 2005). In the 2009 Biological Opinion for construction of the MTRP at the POA, NMFS (2009) stated that, "All of these studies indicate measured background levels are rarely below 125 dB, except in conditions of no wind and slack tide. Thus, although the NMFS harassment zone requirement for non-pulsed noise sources is 120 dB, it is unlikely beluga whales would be able to hear any pile driving noise until it exceeds the background level of 125 dB." Masking of sound below 125 dB by ambient noise is expected to occur for all marine mammals encountered in the project area.

3.2. Biological Environment

3.2.1. Marine Mammals

We provide information on the occurrence of marine mammals most likely present in the proposed Test Pile Program area in Section 1.1.2 of this EA. The marine mammals most likely to be harassed incidental to conducting the Test Pile Program are: Cook Inlet beluga whale, western DPS of the Steller sea lion, harbor seal, harbor porpoise, and killer whale. Cook Inlet beluga whales, harbor seals, and harbor porpoises are the species most likely to be sighted during the Test Pile Program. The occurrence of Steller sea lions in the project area is rare. In June of 2009, a Steller sea lion was documented three times within the same day at the POA during marine mammal monitoring (ICRC 2009). Likewise, very few killer whales are anticipated to approach or be in the vicinity of the project area; no killer whales were spotted during recent surveys by Funk *et al.* (2005), Ireland *et al.* (2005), or Brueggeman *et al.* (2007, 2008a, 2008b). Killer

whales were not documented during POA construction or scientific monitoring (Cornick and Pinney 2011; Cornick and Saxon-Kendall 2008; Cornick *et al.* 2010, 2011; ICRC 2009, 2010, 2011, 2012; Markowitz and McGuire 2007; Prevel-Ramos *et al.* 2006).

Table 3 provides a summary of the abundance and status of the marine mammals likely to occur in the Test Pile Program project area. We provided information on the distribution, population size, and conservation status for each species in the proposed authorization *Federal Register* notice, and we incorporate those descriptions by reference here. The POA's application and the Biological Assessment (HDR 2015b) contain detailed information on life history functions, hearing abilities, and distribution, which is also incorporated by reference and briefly summarized below. The Biological Assessment contains information on Cook Inlet beluga whales and the western DPS of Steller sea lions.

Table 3. Marine mammals in the project area and abundance estimates of marine mammals stocks for which take is proposed to be authorized

Species or Distinct Population Segment (DPS)	Abundance	Comments
Cook Inlet beluga whale (*Delphinapterus leucas*)	312[a]	Occurs in the project area. Depleted under the MMPA, Endangered under the ESA.
Killer (Orca) whale (*Orcinus orca*)	2,347 Resident 587 Transient[b]	Occurs ***rarely*** in the project area. No special status or ESA listing.
Harbor porpoise (*Phocoena phocoena*)	31,046[c]	Occurs ***occasionally*** in the project area. No special status or ESA listing.
Harbor seal (*Phoca vitulina*)	27,386[d]	Occurs in the project area. No special status or ESA listing.
Steller sea lion, western DPS (*Eumetopias jubatus*)	49,497[e]	Occurs ***rarely*** within the project area. Depleted under the MMPA, Endangered under the ESA.

[a] Abundance estimate for the Cook Inlet stock and DPS (Allen and Angliss, 2015).

[b] Abundance estimate for the Eastern North Pacific Alaska Resident stock; the estimate for the transient population is for the Gulf of Alaska, Aleutian Islands, and Bering Sea stock.

[c] Abundance estimate for the Gulf of Alaska stock.

[d] Abundance estimate for the Cook Inlet/Shelikof stock.

[e] Abundance estimate for the Western U.S. Stock.

Source for all population estimates other than Cook Inlet beluga whales: Allen and Angliss 2013, 2014, 2015.

3.2.2. ESA-listed Marine Mammals

3.2.2.1. Cook Inlet Beluga Whale

Beluga whales appear seasonally throughout much of Alaska, except in the Southeast region and the Aleutian Islands. Five stocks are recognized in Alaska: Beaufort Sea stock, eastern Chukchi Sea stock, eastern Bering Sea stock, Bristol Bay stock, and Cook Inlet stock (Allen and Angliss 2014). The Cook Inlet stock is the most isolated of the five stocks, since it is separated from the others by the Alaska Peninsula and resides year-round in Cook Inlet (Laidre *et al.* 2000). Only the Cook Inlet stock inhabits the project area.

NMFS began comprehensive, systematic aerial surveys on beluga whales in Cook Inlet in 1994. Unlike previous efforts, these surveys included the upper, middle, and lower inlet. These surveys documented a decline in abundance of nearly 50 percent between 1994 and 1998, from an estimate of 653 to 347 whales (Rugh *et al.* 2000). In response to this decline, NMFS initiated a status review on the Cook Inlet beluga whale stock pursuant to the MMPA and the ESA in 1998 (63 FR 64228). Annual abundance surveys conducted each June since 1999 indicate that the population has continued to decline from 2002 to 2012 at an annual rate of 0.6 percent (Allen and Angliss 2014).

On October 17, 2008, NMFS announced the listing of the population as endangered under the ESA (73 FR 62919). On April 11, 2011, NMFS designated two areas of critical habitat for beluga whales in Cook Inlet (76 FR 20180). The POA, adjacent navigation channel, and turning basin were excluded from critical habitat designation due to national security reasons (76 FR 20180).

During the spring and summer, beluga whales are generally concentrated near the warmer waters of river mouths where prey availability is high and predator occurrence is low (Moore *et al.* 2000). Most beluga whale calving in Cook Inlet occurs from mid-May to mid-July in the vicinity of the river mouths, although Native hunters have described calving as early as April and as late as August (Huntington 2000).

Presence in Project Area

Beluga whales are the marine mammal most likely to be encountered in the project area. The POA conducted a NMFS-approved monitoring program for beluga whales and other marine mammals focused on the POA area from 2005 to 2011 as part of their permitting requirements for the MTRP. Scientific monitoring was initiated in 2005 and was conducted by LGL Limited (LGL) in 2005 and 2006 (Markowitz and McGuire 2007; Prevel-Ramos *et al.* 2006). Alaska Pacific University resumed scientific monitoring in 2007 (Cornick and Saxon-Kendall 2008) and continued monitoring each year through 2011. Additionally, construction monitoring occurred during in-water construction work.

Data on beluga whale sighting rates, grouping, behavior, and movement indicate that the POA is a relatively low-use area, occasionally visited by lone whales or small groups of whales. They are observed most often at low tide in the fall, with numbers peaking in late August to early September. Although groups with calves have been observed to enter the POA area, data do not suggest that the area is an important nursery area.

Although POA scientific monitoring studies indicate that the area is not used frequently by many beluga whales, it is apparently used for foraging habitat by whales traveling between lower and upper Knik Arm, as individuals and groups of beluga whales have been observed passing through the area each year during monitoring efforts. In all years, diving and traveling were the most common behaviors observed, with many instances of confirmed feeding. Sighting rates at

POA ranged from 0.05 to 0.4 whales per hour (Cornick and Saxon-Kendall 2008; Cornick *et al.* 2011; Markowitz and McGuire 2007; Prevel-Ramos *et al.* 2006), as compared to 3 to 5 whales per hour at Eklutna, 20 to 30 whales per hour at Birchwood, and 3 to 8 whales per hour at Cairn Point (Funk *et al.* 2005), indicating that these areas are of higher use than areas near the POA.

Data collected annually during monitoring efforts demonstrated that few beluga whales were observed in July and early August; numbers of sightings increased in mid- August, with the highest numbers observed late August to mid-September. In all years, beluga whales have been observed to enter the project area while construction activities were taking place, including pile driving and dredging. The most commonly observed behaviors were traveling, diving, and suspected feeding. No apparent behavioral changes or reactions to in-water construction activities were observed by either the construction or scientific observers (Cornick *et al.* 2011).

3.2.2.2. Steller Sea Lion

Two DPSs of Steller sea lion occur in Alaska: the WPS and eastern DPS. The WDPS includes animals that occur west of Cape Suckling, Alaska, and includes individuals within the project area. The western DPS was listed under the ESA as threatened in 1990, and continued population decline resulted in a change in listing status to endangered in 1997. Since 2000, studies have documented a continued decline in the population in the central and western Aleutian Islands; however, the population east of Samalga Pass has increased and potentially is stable (Allen and Angliss 2014). This includes the population that inhabits Cook Inlet.

Presence in Cook Inlet and the Project Area

It is rare for Steller sea lions to be encountered in upper Cook Inlet. Steller sea lions were not documented in upper Cook Inlet during beluga whale aerial surveys conducted annually in June from 1994 through 2012 (Shelden *et al.* 2013).

In June 2009, a Steller sea lion was documented three times within the same day at the POA (ICRC 2009).

3.2.3. Non-ESA Listed Marine Mammals

3.2.3.1. Harbor Seal

There are 12 recognized harbor seal stocks in Alaska. Distribution of the Cook Inlet/Shelikof stock extends from Seal Cape (Coal Bay) through all of upper and lower Cook Inlet. The Cook Inlet/Shelikof stock is estimated at 22,900 individuals (Allen and Angliss 2013). Harbor seals are taken incidentally during commercial fishery operations at an estimated annual mortality of 24 individuals (Allen and Angliss 2013). The estimated average annual subsistence harvest of the Cook Inlet/Shelikof stock is 439 individuals (Allen and Angliss 2013).

Harbor seals inhabit the coastal and estuarine waters of Cook Inlet and are observed in both upper and lower Cook Inlet throughout most of the year (Boveng *et al.* 2012; Shelden *et*

al. 2013). Recent research on satellite-tagged harbor seals observed several movement patterns within Cook Inlet (Boveng *et al.* 2012). In the fall, a portion of the harbor seals appeared to move out of Cook Inlet and into Shelikof Strait, Northern Kodiak Island, and coastal habitats of the Alaska Peninsula. The western coast of Cook Inlet had higher usage than the eastern coast habitats, and harbor seals generally remained south of the Forelands if captured in lower Cook Inlet (Boveng *et al.* 2012).

The presence of harbor seals in upper Cook Inlet is seasonal. Harbor seals are commonly observed along the Susitna River and other tributaries within upper Cook Inlet during eulachon and salmon migrations (NMFS 2003). The major haul-out sites for harbor seals are located in lower Cook Inlet; however, there are a few in upper Cook Inlet (Montgomery *et al.* 2007). During beluga whale aerial surveys of upper Cook Inlet from 1993 to 2012, harbor seals were observed 15 to 60 miles (24 to 96 kilometers) south-southwest of Anchorage at the Chickaloon, Little Susitna, Susitna, Ivan, McArthur, and Beluga rivers (Shelden *et al.* 2013).

Harbor seals are occasionally observed in Knik Arm and in the vicinity of the POA, primarily near the mouth of Ship Creek (Cornick *et al.* 2011; Shelden *et al.* 2013). During annual marine mammal surveys conducted by NMFS since 1994, harbor seals were observed in Knik Arm and in the vicinity of the POA (Shelden *et al.* 2013).

3.2.3.2. Harbor Porpoise

In Alaska, harbor porpoises are divided into three stocks: the Bering Sea stock, the Southeast Alaska stock, and the Gulf of Alaska stock. The Gulf of Alaska stock is currently estimated at 31,046 individuals (Allen and Angliss 2014). NMFS suggests that a finer division of stocks is likely in Alaska (Allen and Angliss 2014). Dahlheim *et al.* (2000) estimated abundance and density of harbor porpoises in Cook Inlet from surveys conducted in the early 1990s. The estimated density of animals in Cook Inlet was 7.2 per 1,000 square kilometers (km^2), with an abundance estimate of 136 (Dahlheim *et al.* 2000), indicating that only a small number use Cook Inlet. Hobbs and Waite (2010) estimated a harbor porpoise density in Cook Inlet of 13 per 1,000 km^2 from aerial beluga whale surveys in the late 1990s. Neither of these surveys included coastlines, which have been documented to be heavily used by harbor porpoises in some years (Shelden *et al.* 2014).

Harbor porpoises have been observed within Knik Arm during monitoring efforts since 2005. During POA construction from 2005 through 2011, harbor porpoises were reported in 2009, 2010, and 2011 (Cornick and Saxon-Kendall 2008; Cornick and Pinney 2009; Cornick *et al.* 2010, 2011; Markowitz and McGuire 2007; Prevel-Ramos *et al.* 2006). In 2009, a total of 20 harbor porpoises were observed during construction monitoring with sightings occurring in June, July, August, October, and November. Harbor porpoises were observed twice in 2010, once in July, and again in August. In 2011, POA monitoring efforts documented harbor porpoises five times, with a total of six individuals in August, October, and November at the POA (Cornick *et al.* 2011). During other monitoring efforts conducted in Knik Arm, there were four sightings of

harbor porpoises in Knik Arm in 2005 (Shelden *et al.* 2014), and a single harbor porpoise was observed within the POA vicinity in October 2007 (URS 2008).

3.2.3.3. Killer Whale

The population of the North Pacific stock of killer whales contains an estimated 2,347 animals in the resident group and 587 animals in the transient group (Allen and Angliss 2014). Numbers of killer whales in Cook Inlet are small compared to the overall population, and most are recorded in lower Cook Inlet.

Killer whales are rare in upper Cook Inlet, and the availability of prey species largely determines the likeliest times for killer whales to be in the area. Killer whales have been sighted in lower Cook Inlet 17 times, with a total of 70 animals between 1993 and 2012 during beluga whale aerial surveys (Shelden *et al.* 2013). No killer whales were observed in upper Cook Inlet during the same time period.

No killer whales were spotted during recent surveys by Funk *et al.* (2005), Ireland *et al.* (2005), or Brueggeman *et al.* (2007, 2008a, 2008b). Killer whales were not documented during POA construction or scientific monitoring (Cornick and Pinney 2011; Cornick and Saxon-Kendall 2008; Cornick *et al.* 2010, 2011; ICRC 2009, 2010, 2011, 2012; Markowitz and McGuire 2007; Prevel-Ramos *et al.* 2006). Very few killer whales, if any, are anticipated to approach or be in the vicinity of the project area.

3.3. Socioeconomic Environment

3.3.1. Subsistence

While Alaska Natives have traditionally harvested subsistence resources in this region for millennia, only limited hunting of harbor seals occurs in the upper Cook Inlet area.

The primary concern is the disturbance of marine mammals through the introduction of anthropogenic sound into the marine environment during the proposed Test Pile Program. Marine mammals could be behaviorally harassed and either become more difficult to hunt or temporarily abandon traditional hunting grounds. Note that the proposed Test Pile Program will not have any impacts to beluga harvests as none currently occur in Cook Inlet.

Harbor seals are the only species for which take is authorized. Take is authorized only for limited boat-based subsistence hunting. Harvests of harbor seals for traditional and subsistence uses by Native peoples are low in upper Cook Inlet. The Alaska Department of Fish and Game (ADF&G) (2015) has collected harvest data for harbor seals in Tyonek for the following years: 1996 (2 seals harvested), 1997 (2 seals harvested), 1998 (0 seals harvested), 2000 (0 seals harvested), 2001 (0 seals harvested), 2002 (3 seals harvested), 2003 (5 seals harvested), 2004 (0 seals harvested), 2005 (0 seals harvested), 2007 (0 seals harvested), and 2008 (9 seals harvested). These figures demonstrate that subsistence harvests of marine mammal species are

minimal. As such, the proposed Test Pile Program is unlikely to have any impact on marine mammal harvests by subsistence hunters

Chapter 4 Environmental Consequences

This chapter of the EA analyzes the impacts of the two alternatives on the human environment. The POA's application, our proposed authorization *Federal Register* notice, and other related environmental analyses identified previously inform our analysis of the direct, indirect, and cumulative effects of our proposed issuance of an Authorization.

Under the MMPA, we have evaluated the potential impacts of the POA's Test Pile Program to determine whether to authorize incidental take of marine mammals. Under NEPA, we have determined that an EA is appropriate to evaluate the potential significance of environmental impacts resulting from the issuance of our annual Authorizations.

4.1. Effects of Alternative 1 – Issuance of an Authorization with Mitigation Measures

Alternative 1 is the Preferred Alternative for which we would issue an Authorization to the POA. This Authorization would allow the incidental take, by Level B harassment, of five species of marine mammals, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the IHA, if issued.

4.1.1. Impacts to Marine Mammal Habitat

The proposed Test Pile Program would not result in permanent impacts to habitats used by marine mammals. In addition, it would not result in permanent impacts to designated critical habitat for beluga whales in the action area as the test piles will be driven in the critical habitat exclusion zone surrounding the POA.

The proposed action would result in temporary changes in the acoustic environment for a minor amount of habitat beyond the exclusion zone that is exposed to unmitigated vibratory pile-driving noise. This would be of very brief duration (6 hours of total vibratory pile driving; approximately 1.2 hours of that (20 percent) would be unmitigated control piles).

The most likely impact to fish or marine mammal prey the proposed Test Pile Program would be temporary behavioral avoidance of the immediate area. In general, the nearer the animal is to the source the higher the likelihood of high energy and a resultant effect (such as mild, moderate, mortal injury). Affected fish would represent only a small portion of food available to marine mammals in the area. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution, and behavior is anticipated. Any behavioral avoidance by fish of the disturbed area will still leave significantly large areas of fish and marine mammal foraging habitat in Knik Arm. Therefore, impacts to marine mammal prey species are likely to be minor and temporary.

Pile installation may temporarily increase turbidity resulting from suspended sediments. Any increases would be temporary, localized, and minimal. POA must comply with state water quality standards during these operations by limiting the extent of turbidity to the immediate project area. In general, turbidity associated with pile installation is localized to about a 25-foot

radius around the pile (Everitt *et al.* 1980). Cetaceans are not expected to be close enough to the project site driving areas to experience effects of turbidity, and any pinnipeds will be transiting the terminal area and could avoid localized areas of turbidity. Therefore, the impact from increased turbidity levels is expected to be discountable to marine mammals. The proposed Test Pile Program will result in temporary changes in the acoustic environment. Marine mammals may experience a temporary loss of habitat because of temporarily elevated noise levels. The most likely impact to marine mammal habitat would be from pile-driving effects on marine mammal prey at and near the POA and minor impacts to the immediate substrate during installation of piles during the proposed Test Pile Program

The POA is planning to install test piles at 6 locations arranged on a roughly north-south alignment near an area that has been classified as critical habitat for the beluga whale. The maximum overlap with critical habitat to the north is 1,677 acres (6.79 sq. km; 2.62 sq. mi.), and the maximum overlap to the south is 2,113 acres (8.55 sq. km; 3.3 sq. mi.), depending on pile location. The two maxima will not occur at the same time because pile installation will only take place at one pile at a time; the northern-most maximum is for the northern-most pile, and the southern-most maximum is for the southern-most pile. As pile location changes, the ensonified area on one side decreases as it increases on the other side. Pile installation in the center of the north-south alignment will ensonify the smallest area of critical habitat. These measurements exclude the area around the POA that was not designated as critical habitat for reasons related to national security. For all pile locations, the temporarily ensonified area represents less than 1% of designated critical habitat in Area 1. As such, the impacts on beluga whale habitat and prey during the proposed Test Pile Program are expected to be minor.

In summary, the long-term effects of any prey displacements are not expected to affect the overall fitness of the Cook Inlet beluga whale population or other affected species. Effects will be minor and will terminate after cessation of the proposed Test Pile Program. Due to the short duration of the activities and the relatively small area of the habitat affected, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences for individual marine mammals or their populations, including Cook Inlet beluga whales.

More information on potential impacts to marine mammal habitat is contained in the POA's application (HDR 2015a), the Biological Assessment (HDR 2015b), NMFS' Biological Opinion and our proposed *Federal Register* Authorization notice.

4.1.2. Impacts to Marine Mammals

The in-water work element of the POA's proposed Test Pile Program includes the installation of 10 48-inch steel shell test piles in the future APMP development area.

Beluga whales occur most frequently in the project area from August through November, with numbers peaking in late August and early September (Funk *et al.* 2005; Markowitz and McGuire 2007; Prevel-Ramos *et al.* 2006; ICRC 2009, 2010, 2011, 2012). Harbor seals and

harbor porpoises have been observed in the project area from May through November (Cornick and Pinney 2011; Cornick and Saxon-Kendall 2007, 2008; Cornick *et al.* 2010, 2011; ICRC 2009, 2010, 2011, 2012; Markowitz and McGuire 2007; Prevel-Ramos *et al.* 2006). The occurrence of Steller sea lions and killer whales in the project area is rare. The Test Pile Program is currently proposed to take place from April 1, 2016 through March 31, 2017. However, work is planned to be completed by July 1, 2017. There is potential for exposure of beluga whales to direct effects associated with pile driving. However, the following effects analysis considers the highest potential for exposure to in-water work which would occur later in the summer and fall and, therefore, should be considered conservative.

The disturbance from acoustic stimuli associated with the proposed Test Pile Program has the potential to impact marine mammals. The effects of sounds from pile driving on marine mammals might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, temporary or permanent hearing impairment, and non-auditory physical effects (Richardson *et al.* 1995a). Our proposed Authorization notice and POA's application (HDR 2015a) provide detailed descriptions of the potential effects of the Test Pile Program on marine mammals. That information is incorporated herein by reference and summarized in this EA.

Numerous studies have shown that underwater sounds from industry activities are often readily detectable by marine mammals in the water at distances of many kilometers. Numerous studies have also shown that marine mammals at distances more than a few kilometers away often show no apparent response to industry activities of various types (Miller *et al.* 2005; Bain and Williams 2006). This is often true even in cases when the sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to underwater sound such as airgun pulses or vessels under some conditions, at other times, marine mammals of all three types have shown no overt reactions (e.g., Malme *et al.* 1986; Richardson *et al.* 1995a, 1995b; Madsen and Mohl 2000; Croll *et al.* 2001; Jacobs and Terhune 2002; Madsen *et al.* 2002; Miller *et al.* 2005).

Masking is the obscuring of sounds of interest by other sounds, often at similar frequencies. Marine mammals are highly dependent on sound, and their ability to recognize sound signals amid other noise is important in communication; predator and prey detection; and, in the case of toothed whales, echolocation. Although some degree of masking is inevitable when high levels of manmade broadband sounds are introduced into the sea, marine mammals have evolved systems and behavior that function to reduce the impacts of masking. Structured signals, such as the echolocation click sequences of small toothed whales, may be readily detected even in the presence of strong background noise because their frequency content and temporal features usually differ strongly from those of the background noise (Au and Moore 1988, 1990). The components of background noise that are similar in frequency to the sound signal in question primarily determine the degree of masking of that signal.

Masking effects of underwater sounds from the POA's proposed activities on marine mammal calls and other natural sounds are anticipated to be limited. For example, beluga whales primarily use high-frequency sounds to communicate and locate prey; therefore, masking by low-frequency sounds associated with project activities is not anticipated to occur (Gales, 1982). There is evidence of other marine mammal species continuing to call in the presence of industrial activity. Annual acoustical monitoring near BP Exploration (Alaska) Inc.'s Northstar production facility during the fall bowhead migration westward through the Beaufort Sea has recorded thousands of calls each year (Richardson *et al.* 1995b; Aerts and Richardson 2008). Construction, maintenance, and operational activities have been occurring from this facility for over 10 years. To compensate and reduce masking, some baleen whales may alter the frequencies of their communication sounds (Richardson *et al.* 1995a; Parks *et al.* 2007). The echolocation clicks produced by the aforementioned marine mammals are usually far above the frequency range of the sounds produced by vibratory pile driving and other construction sounds (e.g., dredging and gravel fill). Blackwell (2005) and URS (2007) reported that background noise at the POA (physical environment and maritime operations) contributed more to received levels than did pile driving at distances greater than 1,300 meters from the source, which is slightly smaller than the Level B harassment zone for impact driving of unattenuated piles.

Pile-driving operations could result in minor masking through overlapping frequencies of the marine mammal signals or by increasing sound levels such that animals are unable to detect important signals over the increased noise. A passive acoustic study in the vicinity of MTRP construction in 2009 measured the frequencies of noise produced as less than 10 kilohertz (kHz), with one exception of impact pile driving, which extended to 20 kHz (Širović and Kendall 2009). Širović and Kendall (2009) and URS (2007) reported that most of the energy during vibratory pile installation activity was measured in the range of 400 to 2,500 hertz (Hz; 0.4 to 2.5 kHz). Vibratory pile driving would more likely mask beluga whale vocalizations than impact pile driving because it is a continuous noise, and the frequency bandwidth is within the range of whistles and noisy vocalizations (up to 10 kHz; Kendall 2010).

Implementation of the proposed mitigation measures would reduce impacts to marine mammals, with any minor masking occurring at close proximity to the sound source, if at all. The area of the proposed Test Pile Program represents a very small area of ensonification relative to the width and size of Knik Arm, further reducing effects on marine mammals. Beluga whales are able to adjust vocalization amplitude and frequency in response to increased noise levels (Scheifele *et al.* 2005). However, the energetic costs of adjusting vocalizations in response to increased noise levels is poorly understood, and it is uncertain how this would affect individual animals. As a result of the intermittent nature of pile driving, the short duration of vibratory pile driving (6 hours), and the relatively low use of the proposed Test Pile Program area by marine mammals, the likelihood of in-water pile-driving operations masking marine mammal social calls or echolocation clicks is low. Moreover, NMFS believes that since the proposed activity is

of short-term duration and with a limited affected area, significant impacts from masking are not likely.

Marine mammals may behaviorally react to sound when exposed to anthropogenic noise. These behavioral reactions are often shown as: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (e.g., socializing or feeding); visible startle response or aggressive behavior (e.g., tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (e.g., pinnipeds flushing into water from haul-outs or rookeries). The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Richardson *et al.* 1995a; Southall *et al.* 2007).

Table 4 outlines our current acoustic thresholds for estimating marine mammal harassment, and Table 5 outlines the distances (in meters) to Level A injury and Level B harassment thresholds (isopleths) for unattenuated and attenuated 48-inch-diameter pile, assuming a 125-dB background noise level as proposed during the POA's Test Pile Program.

Table 4. Current acoustic exposure criteria used by NMFS

Criterion	Criterion Definition	Threshold
Level A Harassment (Injury)	Permanent Threshold Shift (any level above that which is known to cause temporary threshold shift)	180 dB re 1 µPa-m (cetaceans) 190 dB re 1 µPa-m (pinnipeds) root mean square (rms)
Level B Harassment	Behavioral Disruption (for impulse noises)	160 dB re 1 µPa-m (rms)
Level B Harassment	Behavioral Disruption (for continuous noise)	120 dB re 1 µPa-m (rms)/(125 dB re 1 µPa-m (rms)for this project)

Table 5. Distances in meters (m) to NMFS' Level A (injury) and Level B (behavioral) harassment thresholds (isopleths) for unattenuated and attenuated 48-inch-diameter pile, assuming a 125-dB background noise level

Pile diameter (inches)	Impact			Vibratory		
	Pinniped, Level A	Cetacean, Level A	Level B	Pinniped, Level A	Cetacean, Level A	Level B
	190 dB	180 dB	160 dB	190 dB	180 dB	125 dB
48, unattenuated	14 m	63 m	1,359 m	<10 m	<10 m	3,981 m
48, 10 dB Attenuation	<10 m	13 m	293 m	< 10 m	<10 m	858 m

Source: Illingworth & Rodkin, Inc. 2014.

The proposed Test Pile Program may result in temporary harassment of individual marine mammals due to elevated underwater noise, particularly during impact pile driving. Based on individual differences in tolerance to noise, and because shutdown is not proposed for animals other than beluga whales if individuals enter the disturbance harassment zones (160 and 125-dB threshold areas) set for unattenuated piles the potential for acoustic harassment cannot be completely discounted. Therefore, the POA will implement a 100-meter shutdown zone around each pile; therefore, no Level A acoustic injury is anticipated during the Test Pile Program.

In summary, we interpret these effects on all marine mammals as falling within the MMPA definition of Level B (behavioral) harassment. We expect these impacts to be minor because we do not anticipate measurable changes to the population or impacts to rookeries, foraging areas, mating grounds, and other areas of similar significance. Under the Preferred Alternative, we would authorize incidental take, by Level B harassment only, of five species of marine mammals as shown in Table 6. Based on our evaluation of all available data, we expect no long-term substantial adverse effects on marine mammals, their habitats, or their role in the environment.

Table 6. Summary of the estimated numbers of marine mammals potentially exposed to Level B harassment noise levels

Species or Stock	Level B Harassment Threshold (160 dB impact/125 dB vibratory)	Airborne Disturbance Threshold (90 dB harbor seal; 100 dB sea lion)[a]	Total
Cook Inlet beluga whale	26	NA	26
Killer whale	8	NA	8
Harbor porpoise	62	NA	62
Harbor seal	31	0	31
Steller sea lion	6	0	6
Total	**131**	**0**	**133**

[a] No known haulouts occur within the vicinity of the POA. Therefore, pile driving will not exceed the in-air disturbance threshold for hauled-out pinnipeds.

NA indicates Not Applicable.

The POA proposed a number of monitoring and mitigation measures for marine mammals, and we proposed some additional measures as part of our evaluation for the Preferred Alternative. In consideration of the potential effects of the proposed Test Pile Program, we determined that the mitigation and monitoring measures described in Section 2.3.1 of this EA would be appropriate for the Preferred Alternative to meet the purpose and need.

Injury: The POA did not request Authorization to take marine mammals by injury (Level A harassment), serious injury, or mortality. Based on the results of our analyses, the POA's environmental analyses, and previous monitoring reports for the same activities, there is no

evidence that the POA's planned activities would result in injury, serious injury, or mortality of marine mammals within the project area. The mitigation and monitoring measures described in Section 2.3.1 of this EA would minimize any potential risk for marine mammals.

Vessel Strikes: Project-related construction would require the use of tugs and barges, which would likely temporarily increase the occurrence of such vessels in the project area compared to baseline conditions. The contractor would mobilize cranes, tugs, and floating barges, including one derrick barge up to 70 feet wide by 200 feet long. These barges will be moved into location with a tugboat. Cranes will be used to conduct overwater work from barges, which are anticipated to remain on-site for the duration of the Test Pile Program.

The potential for striking marine mammals is a concern with vessel traffic. Studies of whale strikes have established that vessel speed is correlated with risk of striking a whale and with the resulting level of injury (Laist *et al.* 2001; Neilson *et al.* 2012; Vanderlaan and Taggart 2007). In Alaska, an analysis of the characteristics of whale strike incidents found that 44 percent of the vessels were traveling at speeds of 12 knots or greater, and 14 percent were traveling at speeds <12 knots prior to collision (Neilson *et al.* 2012). In addition to vessel speed, factors that increase a vessel's risk of striking a whale include drifting with the engine off, sailing with the motor off, and following or watching whales (Neilson *et al.* 2012). The influence of vessel speed in contributing to either a lethal or a non-lethal injury was examined for records of ship strikes worldwide (Laist *et al.* 2001; Vanderlaan and Taggart 2007). Among collisions between motorized vessels and whales that caused lethal or severe injuries, 89 percent involved vessels moving at 14 knots or faster, and 11 percent involved vessels moving at 10 to 14 knots; no lethal or severe injuries were documented at speeds below 10 knots (Laist *et al.* 2001). Tugs, regardless of whether they are pulling barges, do not generally approach vessel speeds that have been reported to result in vessel strikes. Analysis of the influence of vessel type on whale strikes failed to document any instances of a tug striking a free-swimming whale in the wild (see Laist *et al.* 2001; Neilson *et al.* 2012).

Project-related vessels would not be engaging in activities that heighten the risk of striking whales (e.g., drifting with the engine off, sailing with the motor off, and following or watching whales). Project-related vessels would move at slow speeds or remain anchored or moored as they engage in support for pile driving activities. Tugs, barges, and other project-related vessels would therefore be at low risk of striking a whale or other marine mammal, and the potential for this impact is discountable.

Estimated Take of Marine Mammals by Level B Incidental Harassment: The POA has requested take by Level B harassment as a result of the acoustic stimuli generated by the proposed Test Pile Program. We expect that the Test Pile Program would cause short-term behavioral disturbance for marine mammals in the proposed action area.

As mentioned previously, we estimate that the activities associated with the proposed Test Pile Program could potentially affect, by Level B harassment only, five species of marine mammal under our jurisdiction. For each species, these exposure estimates are small numbers (much less than 1 percent of the population stock for each species, except for beluga whales and transient killer whales, for which estimated exposures are approximately 8.33 and 1.36 percent respectively) relative to the population stock sizes. Table 7 outlines the number of Level B harassment exposures (takes) that we proposed to authorize in this Authorization, the regional population estimates for marine mammals in the action area, and the percentage of each population or stock that may be taken as a result of the POA's activities.

Table 7. Proposed Level B harassment take levels, DPS or stock abundance, and percentage of population proposed to be taken

DPS or Stock	Proposed Level B Take Harassment	Abundance (DPS or Stock)	Percentage of Population
Cook Inlet beluga whale	26	312[a]	8.33
Killer whale	8	2,347 Resident[b] 587 Transient[b]	0.34 Resident 1.36[c]Transient
Harbor porpoise	31	31,046[d]	0.10
Harbor seal	62	27,836[e]	0.22
Western DPS, Steller sea lion	6	49,497[f]	<0.01

[a] Abundance estimate for the Cook Inlet stock and DPS (Allen and Angliss, 2015).

[b] Abundance estimate for the Eastern North Pacific Alaska Resident stock; the estimate for the transient population is for the Gulf of Alaska, Aleutian Islands, and Bering Sea stock.

[c] Assumes all 3 individuals would be from the resident stock or the transient stock.

[d] Abundance estimate for the Gulf of Alaska stock.

[e] Abundance estimate for the Cook Inlet/Shelikof stock.

[f] Abundance estimate for the Western U.S. Stock and western DPS

Source for all population estimates other than Cook Inlet beluga whales: Allen and Angliss 2013, 2014, 2015.

A short summary on how these take numbers were derived is included in this EA. As a conservative measure, the highest daily individual sighting rate for any recorded year were generally used to quantify take of harbor seals and harbor porpoises for pile driving associated with the Test Pile Program. The following equation was used.

> Exposure estimate = (N) * # days of pile driving per site, where:
> N = highest daily abundance estimate for each species in project area.

For harbor porpoises there was only a single sighting of more than one animal so NMFS opted to use a daily abundance rate of one for a total authorized take of 31. For harbor seals there were several reports of two or more animals. Therefore, NMFS applied a daily abundance estimate of two for a total authorized take of 62.

There were three sightings of a single Steller sea lion during construction at the POA in 2009, and it is not possible to know with certainty whether it was one or more animals. Alaska marine waters, including Cook Inlet, are undergoing environmental changes that are correlated with changes in movements of animals, including marine mammals, into expanded or contracted ranges. For example, harbor seals and harbor porpoises are increasing in numbers in Upper Cook Inlet. It is unknown at this time what the impacts of environmental change will be on Steller sea lion movements, but it is possible that Steller sea lions may be sighted more frequently in Upper Cook Inlet, which is generally considered outside their typical range. The Steller sea lions sightings at the POA in 2009 indicate that this species can and does occur in Upper Cook Inlet. As such, NMFS proposed an encounter rate of 1 individual for every 5 pile driving days across 31 driving days in the proposed authorization published in the *Federal Register*. Furthermore, Steller sea lions are social animals and often travel in groups, and a single sighting could include more than one individual. Therefore, the NMFS conservatively estimates that six Steller sea lions could to be observed at the POA during the proposed timeframe of the Test Pile Program.

No killer whales were sighted during previous monitoring programs for the Knik Arm Crossing and POA construction projects, based on a review of monitoring reports. The infrequent sightings of killer whales that are reported in upper Cook Inlet tend to occur when their primary prey (anadromous fish for resident killer whales and beluga whales for transient killer whales) are also in the area (Shelden *et al.* 2003).

With in-water pile driving occurring for only about 27 hours over 31 days, the potential for exposure within the Level B harassment isopleths is anticipated to be extremely low. Level B take is conservatively estimated at no more than 8 killer whales, or two small pods, for the duration of the Test Pile Program.

For beluga whales, aerial surveys of Cook Inlet were completed in June and July from 1993 through 2008 (Goetz *et al.* 2012). Data from these aerial surveys were used along with depth soundings, coastal substrate type, an environmental sensitivity index, an index of anthropogenic disturbance, and information on anadromous fish streams to develop a predictive beluga whale habitat model (Goetz *et al.* 2012).

Three different beluga distribution maps were produced from the habitat model based on sightings of beluga whales during aerial surveys. First, the probability of beluga whale presence was mapped using a binomial (i.e., yes or no) distribution and the results ranged from 0.00 to 0.01. Second, the expected group size was mapped. Group size followed a Poisson distribution, which ranged from 1 to 232 individuals in a group. Third, the product (i.e., multiplication) of these predictive models produced an expected density model, with beluga whale densities ranging from 0 to 1.12 beluga whales/km^2. From this model Goetz *et al.* (2012) developed a raster GIS dataset which provides a predicted density of beluga whales throughout Cook Inlet at a scale of one square kilometer. Habitat maps for beluga whale presence, group size, and density (beluga whales/km^2) were produced from these data and resulting model, including a raster

Geographic Information System data set, which provides a predicted density of beluga whales throughout Cook Inlet at a 1-km^2-scale grid.

The numbers of beluga whales potentially exposed to noise levels above the Level B harassment thresholds for impact (160 dB) and vibratory (125 dB) pile driving were estimated using the following formula:

Beluga Exposure Estimate = N * Area * number of days of pile driving, where:

N =maximum predicted # of belugas whales/km^2

Area = Area of Isopleth (area in km^2 within the 160-dB isopleth for impact pile driving, or area in km^2 within the 125-dB isopleth for vibratory pile driving.

The distances to the Level B harassment and Level A injury isopleths were used to estimate the areas of the Level B harassment and Level A injury zones for an unattenuated a 48-inch pile. Note that 125 dB was used as the Level B harassment zone isopleth since ambient noise is likely elevated in that area. Distances and areas were calculated for both vibratory and impact pile driving, and for cetaceans and pinnipeds. Geographic information system software was used to map the Level B harassment and Level A injury isopleths from each of the six indicator test pile locations. Land masses near the POA, including Cairn Point, the North Extension, and Port MacKenzie, act as barriers to underwater noise and prevent further spread of sound pressure waves. As such, the harassment zones for each threshold were truncated and modified with consideration of these impediments to sound transmission (See Figures 6-1 through 6-6 in the Application). The measured areas (Table 8) were then used in take calculations for beluga whales.

Table 8. Areas of the Level A and Level B harassment zones*

	Impact			Vibratory		
	Pinniped, Level A	**Cetacean, Level A**	**Level B**	**Pinniped, Level A**	**Cetacean, Level A**	**Level B**
Indicator Teste Piles	**190 dB**	**180 dB**	**160 dB**	**190 dB**	**180 dB**	**125 dB**
Piles 3,4	<0.01 km^2	<0.01 km^2	2.24 km^2	0 km^2	0 km^2	15.54 km^2
Pile 1			2.71 km^2			19.54 km^2
Pile 2			2.76 km^2			20.08 km^2
Pile 5,6			2.79 km^2			20.90 km^2
Pile 7			2.80 km^2			20.95 km^2
Piles 8,9,10			3.03 km^2			22.14 km^2

*Based on the distances to sound isopleths for a 48-inch-diameter pile, assuming a 125-dB background noise level

The beluga whale exposure estimate was calculated for each of the six indicator test pile locations separately, because the area of each isopleth was different for each location. The predicted beluga whale density raster (Goetz *et al.* 2012) was overlaid with the isopleth areas for each of the indicator test pile locations. The maximum predicted beluga whale density within each area of isopleth was then used to calculate the beluga whale exposure estimate for each of the indicator test pile locations. The maximum density values ranged from 0.031 to 0.063 beluga whales/km^2 (Table 9).

In the *Federal Register* Notice of proposed authorization, NMFS calculated an incorrect number of driving days at 43.5, which assumed that impact driving would occur on 12.5 days and vibratory could occur on 31 days. Impact and vibratory driving, however, will occur on a total of only 31 days. NMFS summed fractions of takes across days equaling a total of 19.245 takes which was rounded up to 20. NMFS also rounded the large group factor of 11.1 up to 12 resulting in a preliminary take estimate of 32 beluga whales. However, after discussion with the Commission, NMFS revised the take estimates to reflect standard rounding practices to arrive at a number of whole animals likely to be exposed per day

In the revised take estimate, as was done in the *Federal Register* Notice of proposed authorization, the area values were multiplied by the maximum predicted densities for both impact and vibratory driving The impact driving takes per day values were all well below one (see Table 9). Employing standard rounding practices in this final IHA would result in zero takes from impact driving. However, we recognize that there is some non-zero probability of exposure of beluga whales due specifically to impact pile driving and, given that there are a total of 18.5 days of impact pile driving possible, so in the revised take estimate we believe that a conservative estimate of 2 beluga takes during the days of impact driving is reasonable.

Using standard rounding procedures, we estimate that there would be one beluga whale exposed per day of vibratory driving (see Table 9). When considering the projected number of days of vibratory pile driving including a 25 percent contingency for work delays (i.e., 12.5 total days of vibratory driving), we estimate 13 takes from vibratory driving. The takes from impact driving per pile were added to the takes per pile from vibratory driving resulting in an estimated 15 beluga whale takes. Results are shown in Table 9.

Table 9. Estimated Cook Inlet Beluga Whale Takes.

Pile #	Impact pile driving area (km^2)	Impact driving max density (whales/ km^2)	Takes per day impact driving/ Rounded Takes	Vibratory pile driving area (km^2)	Vibratory driving max density (whales/ km^2)	Takes per day vibratory driving/ Rounded Takes
Pile 3	2.24	0.031	0.07/0	15.54	0.056	0.87/1

Pile 4	2.24	0.031	0.07/0	15.54	0.056	0.87/1
Pile 1	2.71	0.042	0.11/0	19.54	0.063	1.23/1
Pile 2	2.76	0.038	0.10/0	20.08	0.062	1.24/1
Pile 5	2.79	0.062	0.17/0	20.9	0.062	1.30/1
Pile 6	2.79	0.062	0.17/0	20.9	0.062	1.30/1
Pile 7	2.8	0.062	0.17/0	20.95	0.062	1.30/1
Pile 8	3.03	0.042	0.13/0	22.14	0.063	1.39/1
Pile 9	3.03	0.042	0.13/0	22.14	0.063	1.39/1
Pile 10	3.03	0.042	0.13/0	22.14	0.063	1.39/1
Total Rounded Takes (assume 18.5 days of impact pile driving)			0	Total Rounded Takes (assume 12.5 days of vibratory pile driving)		12.5
Total Takes			2*	Total Rounded Takes		13
Total Takes From Impact And Vibratory Driving						**15**

*Note that takes per day from impact driving rounded down to zero. NFMS acknowledges the risk of take is greater than zero and as a contingency estimated two total takes from impact pile driving.

The beluga density estimate used for estimating potential beluga exposures does not reflect the reality that beluga whales can travel in large groups. As a contingency that a large group of beluga whales could potentially occur in the project area, NMFS buffered the exposure estimate detailed in the preceding by adding the estimated size of a notional large group of beluga whales. Incorporation of large groups into the beluga whale exposure estimate is intended to cover the possibility that whales could be exposed to behavioral harassment based on what is known about beluga's tendency to travel together in pods. A single large group has been added to the estimate of exposure for beluga whales based on the density method, in the anticipation that the entry of a large group of beluga whales into a Level B harassment zone would take place, at most, one time during the project. To determine the most appropriate size of a large group, two sets of data were examined: (1) Beluga whale sightings collected opportunistically by POA employees since 2008 and (2) Alaska Pacific University (APU) scientific monitoring that occurred from 2007 through 2011.

The APU scientific monitoring data set documents 390 beluga whale sightings. Group size exhibits a mode of 1 and a median of 2, indicating that over half of the beluga groups observed over the 5-year span of the monitoring program were of individual beluga whales or groups of 2. As expected, the opportunistic sighting data from the POA do not reflect this preponderance of small groups. The POA opportunistic data do indicate, however, that large groups of belugas were regularly seen in the area over the past 7 years, and that group sizes ranged as high as 100 whales. Of the 131 sightings documented in the POA opportunistic data set, 48 groups were of 15 or more beluga whales.

The 95th percentile of group size for the APU scientific monitoring data is 11.1 beluga whales, rounded down to 11 beluga whales. In the *Federal Register* Notice of proposed authorization, the value was erroneously rounded up to 12. This means that, of the 390 documented beluga whale groups in this data set, 95 percent consisted of fewer than 11.1 whales; 5 percent of the groups consisted of more than 11.1 whales. Therefore, it is improbable that a group of more than 11 beluga whales would occur during the Test Pile Program. This number balances reduced risk to the POA with protection of beluga whales. POA opportunistic observations indicate that many groups of greater than 11 beluga whales commonly transit through the project area. APU scientific monitoring data indicate that 5 percent of their documented groups consisted of greater than 11 beluga whales. To reduce the chance of POA reaching or exceeding authorized take, and to minimize harassment to beluga whales, in-water pile driving operations will be shut down when one or more beluga whales are observed within or appear likely to enter the Level B harassment zones (160 dB impulsive sound zone of 1,359 m radius, and 125 dB non-impulsive sound zone of 3,981 m radius) when driving unattenuated piles. All of the remaining piles will be subjected to a sound attenuation treatment including encapsulated bubble curtains or the adBM Resonance system. These systems have been shown to mitigate sound levels. One of the primary objectives of the Test Pile Program is to measure the amount of attenuation provided by these systems. NMFS will assume that these systems will provide at least 10 dB noise reduction. Therefore, for sound-attenuated piles (#3-10), automatic shut-down will occur when one or more beluga whales are observed within or appear likely to enter the Level B harassment 160 dB and 125 dB (293 m and 858 m respectively) zones for impulsive and non-impulsive sound.

The total number of estimated and authorized takes of Cook Inlet beluga whales is, therefore, 15 (13 vibratory/2 impact driving) using the density method plus 11 based on the large group adjustment, resulting in 26 total incidents of take. No Level A harassment is expected or authorized.

Note that this take estimate and authorization is based on the zone of influence extending out to the 160 dB and 125 Level B thresholds for unattenuated piles (1,359 m and 3,981 m). NMFS has opted to employ an impact and vibratory Level B shut-down zone for attenuated piles as a conservative measure in case the attenuated treatments do not fully provide the anticipated noise level reduction of 10 dB. During attenuated driving POA will still be required to monitor the Level B zones out to the Level B unattenuated impact and vibratory thresholds of 1,359 m and 3,981 m. Any beluga whales observed in these outer zones will be recorded as take and driving will be allowed to continue unless the animal(s) approach or enter the shut-down zones set at the attenuated thresholds at 293 m and 858 m for impact and vibratory driving respectfully.

Given the relatively small number of animals of each species for which take is authorized, we do not anticipate that the proposed pile installation activities to impact rates of recruitment of survival for any affected species or stock.

4.1.3. Impacts to Subsistence

Under Alternative 1 (the Preferred Alternative), the POA's proposed Test Pile Program in upper Cook Inlet is anticipated to have none to minor (temporary) effects on subsistence wildlife and marine mammals in the area. Noise from the Test Pile Program might temporarily displace wildlife from the area, but animals are anticipated to return to the area following the cessation of noise sources during Test Pile Program activities. Pile installation will be of short duration and intermittent both within and among days, further minimizing potential impacts to wildlife.

Residents of the Native Village of Tyonek are the primary marine mammal subsistence users in the Knik Arm area and have previously harvested harbor seals and beluga whales. Harvests of harbor seals for traditional and subsistence uses by Native peoples are low in upper Cook Inlet ADF&G (2015). Due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in Section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected Alaska Native Organizations (Public Law No. 106-31, Section 3022, 113 Stat. 57,100). That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, Section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the CIMMC, an Alaska Native Organization representing Cook Inlet beluga whale hunters, which allowed for the harvest of 1 to 2 beluga whales. On October 15, 2008, NMFS published a final rule that established long-term harvest limits on Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibited harvest for a 5-year period (e.g. 2008-2012, 2013-2017), if the average abundance for the Cook Inlet beluga whales from the prior 5 years (e.g. 2003-2007) was below 350 whales.

As project activities would take place within the immediate vicinity of the POA, no activities would occur in or near Tyonek's identified traditional subsistence hunting areas. As the harvest of marine mammals in upper Cook Inlet is historically a smaller portion of the total subsistence harvest, and the number of marine mammals using upper Cook Inlet is proportionately small, the number of marine mammals harvested in upper Cook Inlet is anticipated to remain low. As the proposed project could result in temporary disturbances to small numbers of marine mammals during construction, the proposed project would not impact the availability of these other marine mammal species for subsistence uses.

The primary concern related to subsistence use includes temporary disturbance and displacement of marine mammals by noise from construction activities. Since anticipated project impacts may involve temporary changes in behavior, construction activities associated with project activities would not impact availability of species subsistence uses. Since subsistence use of marine mammals in the POA area does not generally occur, and the impacts to marine mammals from the project are anticipated to be minimal, no increase in competition for subsistence resources and no change in regional subsistence use patterns would be anticipated.

The proposed Test Pile Program is anticipated to have minor, temporary effects on subsistence wildlife and marine mammals in the area. However, due to this potential POA communicated with representative Native subsistence users and Tribal members to develop a Plan of Cooperation or other relevant information, if necessary, which identifies what measures have been taken or will be taken to minimize any adverse effects of the Test Pile Program on the availability of marine mammals for subsistence uses. On December 22, 2015, POA sent letters to eight tribes including the the Kenaitze, Tyonek, Knik, Eklutna, Ninilchik, Seldovia, Salamatoff, and Chickaloon tribes informing them of the project and identifying potential impacts to marine mammals as well as planned mitigation efforts. POA also inquired about any possible marine mammal subsistence concerns they might have. None of the tribes indicated that they had any concerns with the proposed Test Pile Program.

NMFS anticipates that any effects from the POA's proposed Test Pile Program on marine mammals, especially harbor seals and Cook Inlet beluga whales, which are or have been taken for subsistence uses in Cook Inlet, would be short term, site specific, and limited to minimal changes in behavior and mild stress responses. NMFS does not anticipate that the authorized taking of affected species or stocks would reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (1) Causing the marine mammals to abandon or avoid hunting areas; (2) directly displacing subsistence users; or (3) placing physical barriers between the marine mammals and the subsistence hunters and that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met. Therefore, we anticipate the impacts to subsistence hunting from the Preferred Alternative would be negligible.

4.2. Effects of Alternative 2 – No Action Alternative

Under the No Action Alternative, we would not issue an Authorization to the POA. As a result, the POA would not receive an exemption from MMPA prohibitions against the take of marine mammals and would be in violation of the MMPA if take of marine mammals occurs.

The impacts to elements of the human environment resulting from the No Action Alternative—conducting the Test Pile Program in the absence of required protective measures for marine mammals under the MMPA—would be greater than those impacts resulting from Alternative 1, the Preferred Alternative.

4.2.1. Impacts to Marine Mammal Habitat

Under the No Action Alternative, the effects on the physical environment or on components of the biological environment that function as marine mammal habitat would result from the POA's planned activities under the Test Pile Program, which we evaluated in the referenced documents (see Section 1.3.1). Even without mitigation measures, impacts to marine mammal habitat (including prey species) would be minimal and temporary because (1) pile installation would be of short duration and intermittent both within days and among days; (2) the area of potential

effect is limited and localized; (3) only a small percentage (less than 1 percent) of available beluga whale critical habitat would be affected as the test piles will be driven in the critical habitat exclusion zone surrounding the POA; and (4) there are no known breeding or nursery areas, or areas of significant biological importance to marine mammals, in the project area. The most likely impact to marine mammal habitat would occur from minor impacts to the immediate substrate during installation of piles during the project or from temporary avoidance by prey species of the immediate area. This alternative would result in effects on the physical environment and components of the biological environment that function as marine mammal habitat that are similar to Alternative 1.

4.2.2. Impacts to Marine Mammals

Under the No Action Alternative, the POA's Test Pile Program activities would likely result in increased amounts of Level B harassment to marine mammals and possibly takes by injury (Level A harassment)—specifically related to acoustic stimuli—due to the absence of mitigation and monitoring measures required under the Authorization. While it is difficult to provide an exact number of takes that might occur under the No Action Alternative, the numbers would be anticipated to be larger than those presented in Table 7 above because the POA would not be required to abide by restrictions to reduce the number and severity of takes of beluga whales or other marine mammals. Moreover, the POA would not be required to shut down activities when beluga whales are seen approaching the Level B isopleths, which is meant to reduce disturbance to the animals.

If the activities proceeded without the protective measures and reporting requirements required by final Authorizations under the MMPA, the direct, indirect, or cumulative effects on the human or natural environment of not issuing the Authorizations would include the following:

- Marine mammals within the survey area could experience injury (Level A harassment) and higher levels of Level B harassment. The lack of mitigation measures required in the Authorizations could lead to vessels not altering course around marine mammals, not using soft start or ramping up procedures when beginning pile driving activities, and not shutting down for large groups of beluga whales and beluga whale calves;

- Increases in the number of behavioral responses and frequency of changes in animal distribution could occur because of the lack of mitigation measures required in the Authorization. Thus, the incidental take of marine mammals would likely occur at higher levels than we have identified in Table 9;

- We would not be able to obtain the monitoring and reporting data needed to assess the anticipated impact of the activity upon the species or stock, as well as increased knowledge of the species, as required under the MMPA.

4.2.3. Impacts to Subsistence

Under the No Action Alternative, the Test Pile Program would have no additive effects on subsistence beyond those resulting from the POA's activities, which we evaluated in the referenced documents (see Section 1.3.1). Subsistence hunting of Cook Inlet beluga whales is not allowed at this time, and subsistence hunts of other marine mammal species is limited in this area, as described earlier in this EA (see Section 3.3.1). The only potential difference in impacts is that the POA would not be required to ensure availability of marine mammals for subsistence uses and would not be required to implement mitigation measures to that effect.

4.3. Compliance with Necessary Laws – Necessary Federal Permits

We have determined that the issuance of an Authorization is consistent with the applicable requirements of the MMPA, ESA, MSFMCA, and our regulations. Please refer to Section 1.4 of this Final EA for more information.

4.4. Unavoidable Adverse Impacts

We acknowledge that the incidental take authorized would potentially result in unavoidable adverse impacts. However, we do not anticipate the POA's activities to have adverse consequences on the viability of marine mammals in Cook Inlet or on the availability of marine mammals for subsistence uses, and we do not anticipate the marine mammal populations in that area to experience reductions in reproduction, numbers, or distribution that might appreciably reduce their likelihood of surviving and recovering in the wild. We anticipate that the numbers of individuals of all species taken by harassment would be small (relative to species or stock abundance), that the Test Pile Program and the take resulting from the activities would have a negligible impact on the affected species or stocks of marine mammals, and that there would not be an unmitigable adverse impact to subsistence uses of marine mammals in Cook Inlet.

4.5. Cumulative Effects

NEPA defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR §1508.7). Cumulative impacts can result from individually minor, but collectively significant, actions that take place over a period of time.

The Cook Inlet region is a major population center in the State of Alaska and supports a wide range of activities.Past actions in Cook Inlet and Alaska have generally produced lasting impacts and continue to shape the present day environment, or baseline conditions. The growth of communities and their infrastructure and public works, development of industries, and changes of land use over time contribute to the status of the marine mammals and habitat in Cook Inlet. Such actions include the construction of the Alaska Railroad (1913-1923), founding of Anchorage (1915), founding of Wasilla (1917), the completion of the deep water dock near Ship Creek (1919), establishment of the Air Force and Army bases (1939), World War II related

expansion within Alaska (1941-1945), development of Kenai Peninsula and Cook Inlet oil and natural gas (1960s), discovery of oil in Prudhoe Bay (1968), and the Alaska Native Claims Settlement Act (1971).

The proposed Test Pile Program would add another temporary, industrial activity to upper Cook Inlet. This activity would be limited and localized to a small area of the upper Cook Inlet for a relatively short period of time.

The following sections outline a brief summary of the human-related activities affecting the marine mammal species in the action area.

4.5.1. Subsistence Hunting

In Cook Inlet, Native hunters historically have hunted beluga whales and harbor seals for food. The subsistence harvest of beluga whales transcends nutritional and economic value of the whale as the harvest is an integral part of the cultural identity of the region's Alaska Native communities. Inedible parts of the whale provide Native artisans with materials for cultural handicrafts, and the hunting perpetuates Native traditions by transmitting traditional skills and knowledge to younger generations. However, due to dramatic declines in the Cook Inlet beluga whale population, hunting of beluga whales for subsistence purposes in Cook Inlet is prohibited while hunting of harbor seals is limited. Additional information about subsistence hunting may be found in Section 4.1.3.

4.5.2. Pollution

An increase in the amount of pollutants that enter Cook Inlet is likely to occur as populations in urban areas continue to grow. Sources of pollutants in urban areas include runoff from streets and discharge from wastewater treatment facilities. Gas, oil, and coastal zone development projects (See Sections 4.5.5 and 4.5.6) also contribute to pollutants that enter Cook Inlet through discharge. Gas, oil, and coastal zone development would continue to take place in Cook Inlet; therefore, it would be anticipated that pollutants could increase in Cook Inlet. However, the U.S. Environmental Protection Agency and the Alaska Department of Environmental Conservation will continue to regulate the amount of pollutants that enter Cook Inlet from point and non-point sources through Alaska Pollutant Discharge Elimination System permits. As a result, permittees will be required to renew their permits, verify they meet permit standards and potentially upgrade facilities. Additionally, the extreme tides and strong currents in Cook Inlet may contribute in reducing the amount of pollutants found in the Inlet.

4.5.3. Fisheries Interaction

Fishing is a major industry in Alaska. As long as fish stocks are sustainable, subsistence, personal use, recreational, and commercial fishing would continue to take place in Cook Inlet. As a result there would be continued prey competition, risk of ship strikes, potential harassment, potential for entanglement in fishing gear, and potential displacement from important foraging habitat for the Cook Inlet beluga whales and other marine mammals. NMFS and the ADF&G

will continue to manage fish stocks as well as monitor and regulate fishing in Cook Inlet to maintain sustainable stocks.

4.5.4. Vessel Traffic

Major contributors to vessel traffic throughout Cook Inlet include port facilities, oil and gas development, and commercial and recreational fishing.

The POA yields a high volume of vessel traffic that passes through or near the action area. The POA provides 90 percent of the consumer goods for 85 percent of the State of Alaska. The POA handles the majority of Alaska's refined petroleum products and the bulk of jet fuel for JBER and the Ted Stevens Anchorage International Airport (100 and 60 percent respectively; POA 2014). Major vessels calling to the POA include cargo ships, barges, tankers, dredgers, military ships, and tug boats (POA 2009). Based on data from 1998 to 2011, an average of approximately 450 vessels call to the POA annually (POA 2014). The POA is proposing to modernize its facilities (see Section 4.5.5 below) which would result in increased vessel traffic once the project is complete.

Port MacKenzie is located in upper Cook Inlet as well. It also contributes to vessel traffic that passes through or near the action area. It receives approximately two large ships (a landing craft and/or a barge) annually, which is substantially less than the POA. The Port MacKenzie Rail Extension Project, which connects Port MacKenzie to the Alaska Railroad Corporation's existing mainline between Wasilla and Willow, will provide freight service between Port MacKenzie and Interior Alaska. Its construction is nearing completion. Additionally, Port MacKenzie is currently preparing permits to construct a deep draft dock. As a result, the number of ships calling to port at Port MacKenzie is anticipated to increase over the next 5 years. Increased vessel traffic could result in increased in-water noise and potential ship strikes with marine mammals.

To a lesser extent, other smaller port facilities may contribute to vessel traffic in the action area. These include Nikiski, the City of Kenai, Kasilof, Williamsport, Tyonek, and Drift River. Vessels ranging from tankers to fishing boats call to these ports (Kenai Peninsula Borough 2003). Gas and oil development, as well as commercial and recreational fishing vessels, also contribute to vessel traffic in the action area.

4.5.5. Coastal Zone Development

Coastal zone development may result in the loss of habitat, increased vessel traffic, increased pollutants, and increased noise associated with construction and activities of the projects after construction. Large projects within Cook Inlet include Chuitna Coal Mine and the Ocean Renewable Power Company Tidal Energy Project. The POA is proposing to modernize their facilities through the APMP, and Port MacKenzie has the potential to expand their facilities depending on future needs associated with large resource development projects. Both port facilities may have an effect on marine mammals due to increased vessel traffic passing through the area on their way to both facilities. Another project is the Knik Arm Crossing which is a

long-planned bridge project linking Anchorage and Port MacKenzie. Construction activities associated with these projects, as well as the placement of piers and abutments, may have an effect on marine mammals, their habitat, and their prey species. NMFS identifies other projects under various phases of review on its website at: https://alaskafisheries.noaa.gov/protectedresources/whales/beluga/development.htm.

4.5.6. Oil and Gas Development

There are seventeen existing oil and gas drilling platforms within Cook Inlet. Seismic surveys in Cook Inlet are anticipated to continue for the next 3 to 5 years as the industry seeks a better understanding of available oil and gas deposits. NMFS has received applications requesting takes of marine mammals incidental to seismic surveys and drilling operations.

Impacts from gas and oil development include increased noise from seismic activity, vessel and air traffic, and well drilling; discharge of wastewater; habitat loss from the construction of oil and gas facilities; and contaminated food sources and/or injury from a natural gas blowout or oil spill. The risk of these impacts may increase as oil and gas development increases; however, new development will undergo consultation and permitting requirements prior to exploration and development. If Authorizations are issued to these other applicants, they would be required to implement mitigation and monitoring measures to reduce impacts to marine mammals and their habitat in the area, and would be subject to the same MMPA and ESA standards.

4.5.7. Marine Mammal Research

Many important aspects of marine mammal biology remain unknown, or are incompletely studied. In addition, management of these species and stocks requires knowledge of their distribution, abundance, migration, population, ecology, physiology, genetics, behavior, and health. Therefore, free-ranging marine mammal species are frequently targeted for scientific research and studies.

Research activities normally include close approach by vessel and aircraft for line-transect surveys; behavioral observation; photo-identification and photo-video-grammetry; passive acoustic recording; attachment of scientific instruments (tagging), both by implantable and suction cup tags; biopsy sampling, including skin and blubber biopsy and swabbing; land-based surveys; live capture for health assessments, and blood and tissue sampling, pinniped tooth extraction, and related pinniped anesthesia procedures. All researchers are required to obtain a scientific research permit from NMFS Office of Protected Resources under the MMPA and/or ESA (if an ESA-listed species is involved). Currently, the permits authorizing research on beluga whales in Cook Inlet, as wells as permits authorizing research on harbor seals, harbor porpoises, Steller sea lions, and killer whales in Alaskan waters, may have cumulative effects on these species and stocks. NMFS anticipates that scientific research on marine mammals in Cook Inlet will continue, and possibly expand, due to the increasing need to better understand distribution

and abundance relative to temporal (e.g., seasonal, diel, or tidal) and spatial (i.e., geographic or bathymetric) parameters.

4.5.8. Climate Change

The 2007 Intergovernmental Panel on Climate Change concluded that there is very strong evidence for global warming and associated weather changes and that humans have "very likely" contributed to the problem through burning fossil fuels and adding other "greenhouse gases" to the atmosphere (IPCC 2007). This study involved numerous models to predict changes in temperature, sea level, ice pack dynamics, and other parameters under a variety of future conditions, including different scenarios for how human populations respond to the implications of the study.

Evidence of climate change in the past few decades, commonly referred to as global warming, has accumulated from a variety of geophysical, biological, oceanographic, and atmospheric sources. The scientific evidence indicates that average air, land, and sea temperatures are increasing at an accelerating rate. Although climate changes have been documented over large areas of the world, the changes are not uniform and affect different areas in different ways and intensities. Arctic regions have experienced some of the largest changes, with major implications for the marine environment as well as for coastal communities.

Marine mammals are classified as sentinel species because they are good indicators of environmental change. Arctic marine mammals are ideal indicator species for climate change, due to their circumpolar distribution and close association with ice formation. NMFS recognizes that warming of the Arctic, which results in the diminishing of ice thickness and spatial extent, could be a cause for concern for marine mammals. In Cook Inlet, marine mammal distribution is dependent upon ice formation and prey availability, among other factors. For example, beluga whales often travel just along the ice pack and feed on prey beneath it (Richardson *et al.* 1990, 1991). Any loss of ice could result in prey distribution changes or loss for beluga whales or other marine mammals; however, beluga whales, harbor seals, harbor porpoises and other marine mammals in Cook Inlet do not use ice for resting, reproduction, or rearing of young like ice dependent pinnipeds.

It is not clear how governments and individuals would respond, or how much these future efforts would reduce greenhouse gas emissions. Although the intensity of climate change would depend on how quickly and deeply humanity responds, the models predict that the climate changes observed in the past 30 years would continue at the same or increasing rates for at least 20 years. Although NMFS recognizes that climate change is a concern for the sustainability of the entire ecosystem in Cook Inlet, it is unclear at this time the full extent to which climate change would affect marine mammals in Cook Inlet.

4.5.9. Conclusion

Based on the summation of activity in the area provided in this section, NMFS believes that the incremental impact of an Authorization for the POA's proposed Test Pile Program in Cook Inlet would not be anticipated to result in a cumulative significant impact to the human environment from past, present, and future activities. The proposed project would add an incremental contribution to the combined environmental impacts of other past, present, and reasonably foreseeable future actions; however, it would not raise those actions to levels considered significant. The potential impacts to marine mammals, their habitats, and the human environment in general are anticipated to be minimal based on the limited and temporary noise footprint.

Chapter 5 List of Preparers and Agencies Consulted

Agencies Consulted
Office of Protected Resources
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